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Undoubtedly most home owners when approached on the proposition of using gravity ventilators to cool and circulate air within the house picture the application as looking like this. We know that such an application is obviously grotesque, yet the fact remains that this prejudice against appearance is by far the biggest stumbling block to the sale of millions of residence ventilators. In this issue is the first of a series of articles on residence ventilation.

FEBRUARY 15, 1932

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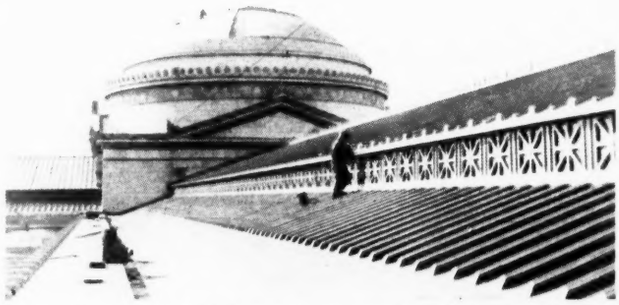
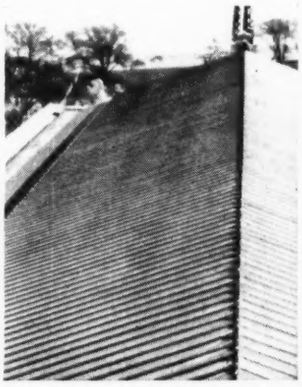


A view from the roof of the east wing, showing "Union Jack" Copper panels. Sheet Metal Contractors: Kitzelman Company, Chicago; Stamped Copper by Friedly-Voshardt Company and the Milcor Company. Modeling by McNulty Brothers.



Ridge of the east wing as seen from the main dome. All Revere Copper: a fine example of roofing.

One of the copper finials for the small dome. Finials, cresting and deck of Revere Copper.

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FEBRUARY 15, 1932

VOL. 101, NO. 4

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Published Every Other Monday

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139 N. Clark St.
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Central 7670

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Room 1109
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Yearly Subscription Price—In United States, $2.00; Canada (including duty), $4.30; Foreign, $4.00; Single Copies, $.25.

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Founded 1880

~

J. D. Wilder
Editor

Platte Overton
Engineering Editor

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Entered as second-class matter, January 29, 1930, at the Post Office at Chicago, Illinois, under the act of March 3, 1879. Formerly entered on June 25, as American Artisan and Hardware Record

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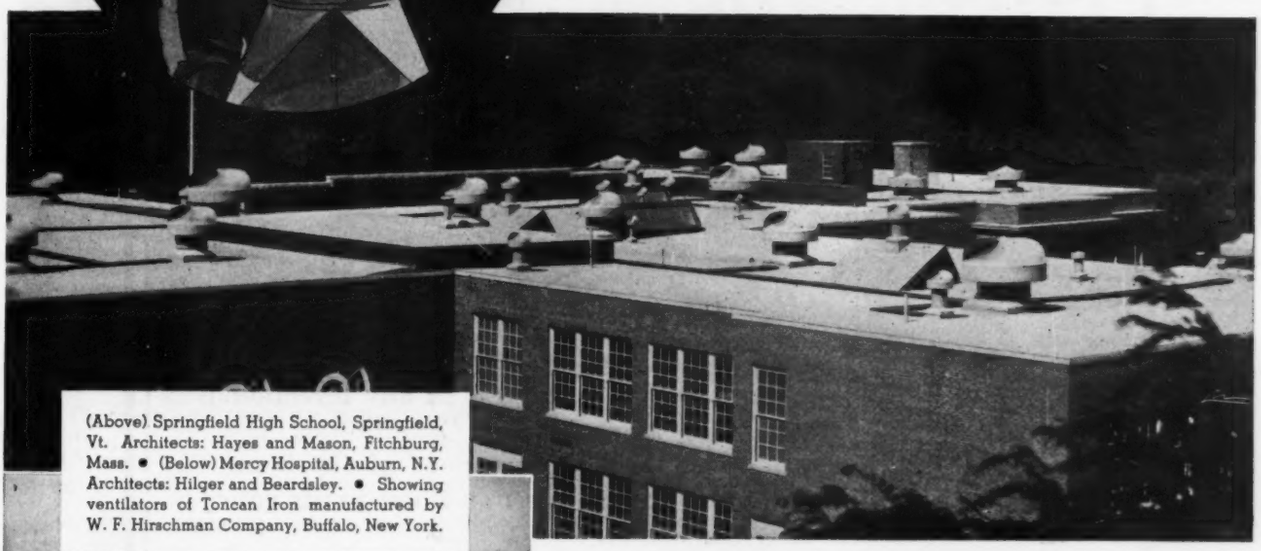

(Above) Springfield High School, Springfield, Vt. Architects: Hayes and Mason, Fitchburg, Mass. • (Below) Mercy Hospital, Auburn, N.Y. Architects: Hilger and Beardsley. • Showing ventilators of Toncan Iron manufactured by W. F. Hirschman Company, Buffalo, New York.

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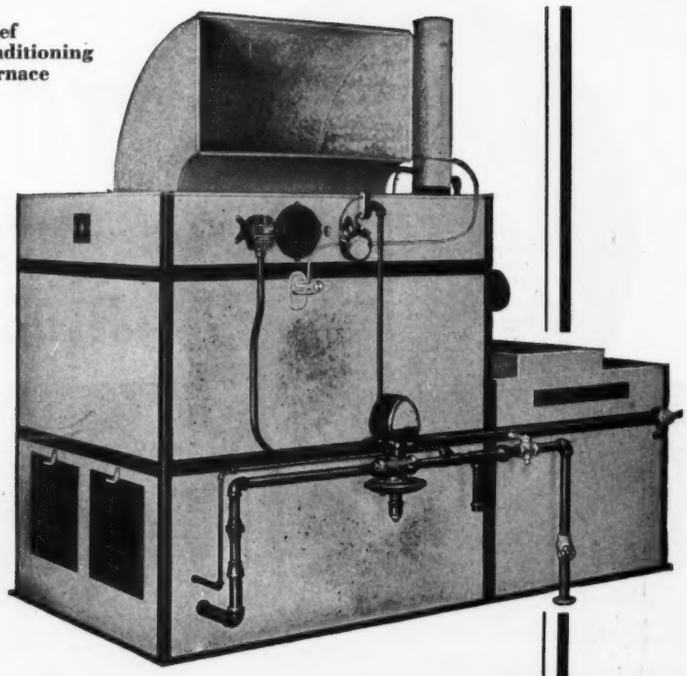

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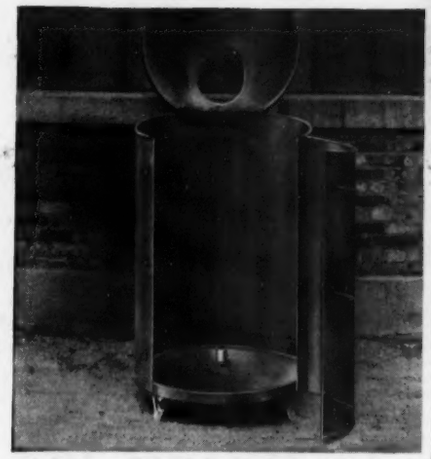

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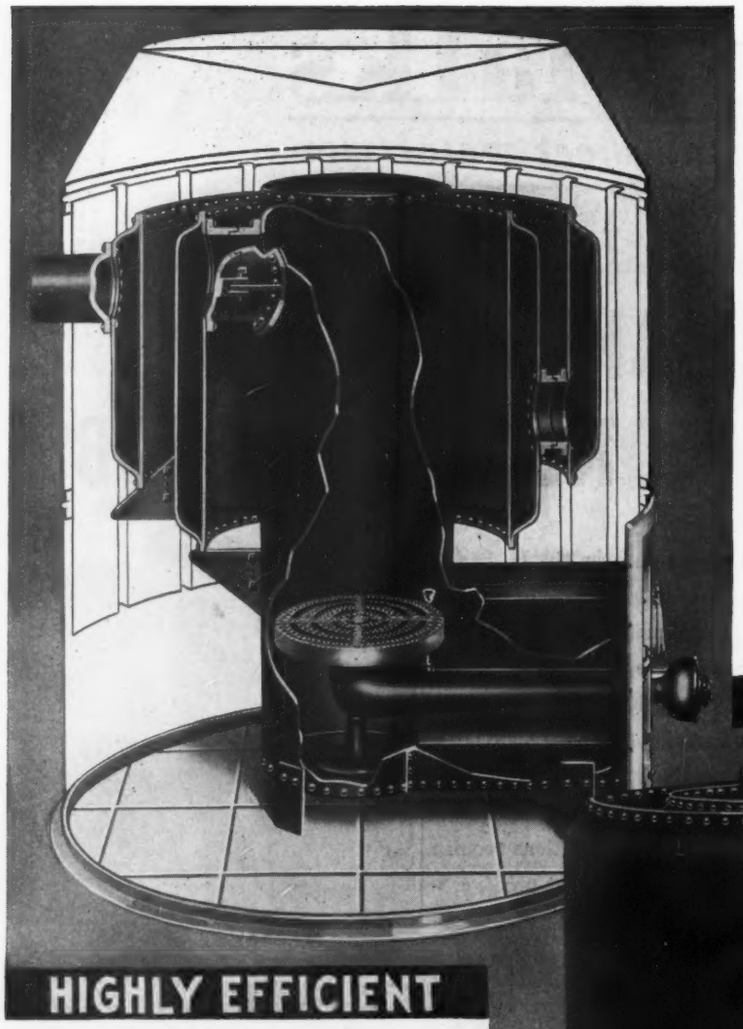

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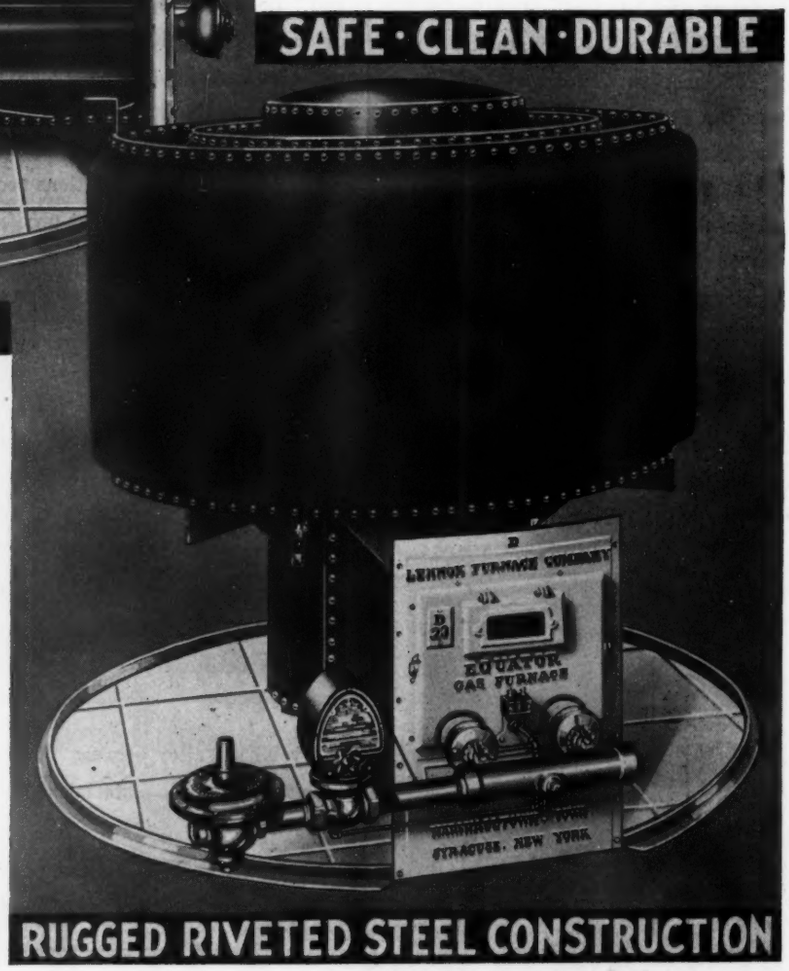

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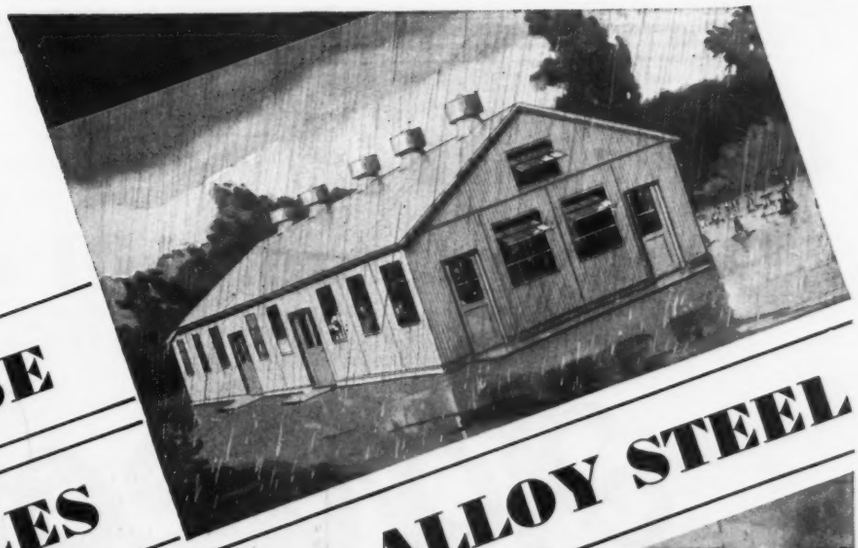

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VOLUME 101 NUMBER 4

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

Gravity Ventilation for Cooling

EVERY reader with a sense of humor will immediately realize that the illustration on the front cover of this issue is grotesquely exaggerated.

Yet isn't it a fact that this very exaggerated photograph represents the average home owner's idea of what a ventilator will do to the appearance of his house?

And worse yet, the same idea is probably chasing around in the minds of a lot of sheet metal contractors who ought to realize that home ventilation is a field so big that we can hardly visualize it.

The winter we are now passing through has been a remarkably mild season. If the summer which is to come follows precedent, June, July, August and September will probably see long periods of high temperatures and high humidities, with their attendant discomfort.

And if home air conditioning gets as popular as we think, then we may be sure that every home owner will wish he had some sort of a system to cool his house. That every one of this great army of home owners is not going to have enough money to convert his present heating system into a summer cooling system is a foregone conclusion. Nevertheless, even the owners who will not be able to buy summer cooling, will wish they had it.

Residence gravity ventilation is one way by which a great deal of improvement can be given the owner. If we will pause for a minute and remember our fundamental physics we will understand that cooling is based upon comparatively simple physical phenomena.

The cycle goes about like this. The sun, rising early, begins to pour its radiant heat into the roof and walls, unless the house is hidden in trees, and keeps sending more heat hour after hour. The materials of the roof and walls soak up this heat and by conduction pass this heat through the materials and into the interior. The temperature rises even after two or three o'clock because the stored-up heat in the materials keeps on sending heat into the air of the rooms.

Our grandmothers used to combat this transmission of heat by pulling down all the window blinds. And even though modern housewives put this down as superstitution, the fact remains that drawn blinds do keep much radiant heat from passing through glass which presents so little obstruction to the passage of light and heat.

Insulation, as we know it today, is excellent because while exterior materials heat up, this heat is not conducted through to the interior. In a house 100 per cent insulated as to walls, the heat has to go through the glass and come in by infiltration.

The logical thing to do, then, is to carry away this heated air just as rapidly as possible. A fan taking the air from against the walls and ceilings and cooling it in the basement does the trick, but good results can also be obtained by exhausting this hot air to the outside. Another point in favor of ventilators is that as this heated air is pushed to the outside, cool air from the basement can be substituted.

With fan systems the rapid turnover of air makes both basement and upstairs air of equal temperatures after the first few changes by the fan.

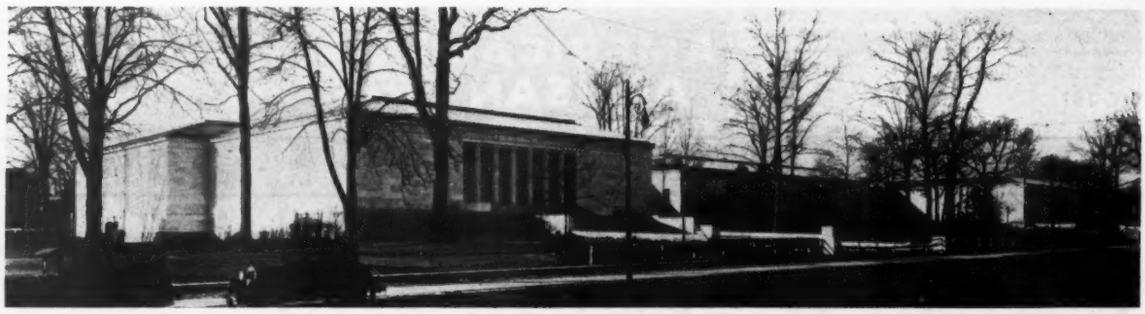
This idea of ventilating hot interiors is not new. We've been using it in barns, outhouses on the farm, in factories, and industrial buildings for generations.

The only reason we haven't adopted it for the residence is because the home owner simply won't have a ventilator on the roof. It won't be the easiest thing in the world to sell comfort over exterior appearance. But the idea is sound and if every contractor will, by some hook or crook, get one ventilator in each neighborhood, others will follow, first through curiosity and second because this system really works.

Now is the time to get this idea into circulation. If the battle is to be long and difficult, the thing to do is to begin to look around for that first "foolish virgin" who will take comfort in preference to appearance. February is not too early to begin this weeding out process.

In times like these every marketable idea should be worth a trial at least. It won't cost any more to ring doorbells looking for a ventilation prospect than it will to sit in the office and pare the old finger nails.

Folks will want to listen to your story of summer comfort. Especially when that comfort doesn't cost any more than the installation of a ventilator. But remember, you are not selling air conditioning or refrigeration and don't oversell.



Heating the Toledo Museum

By **SAMUEL R. LEWIS**
Consulting Engineer, Chicago

IT is not often, especially in a museum, that we find no pipes or ducts in the stories above the basement.

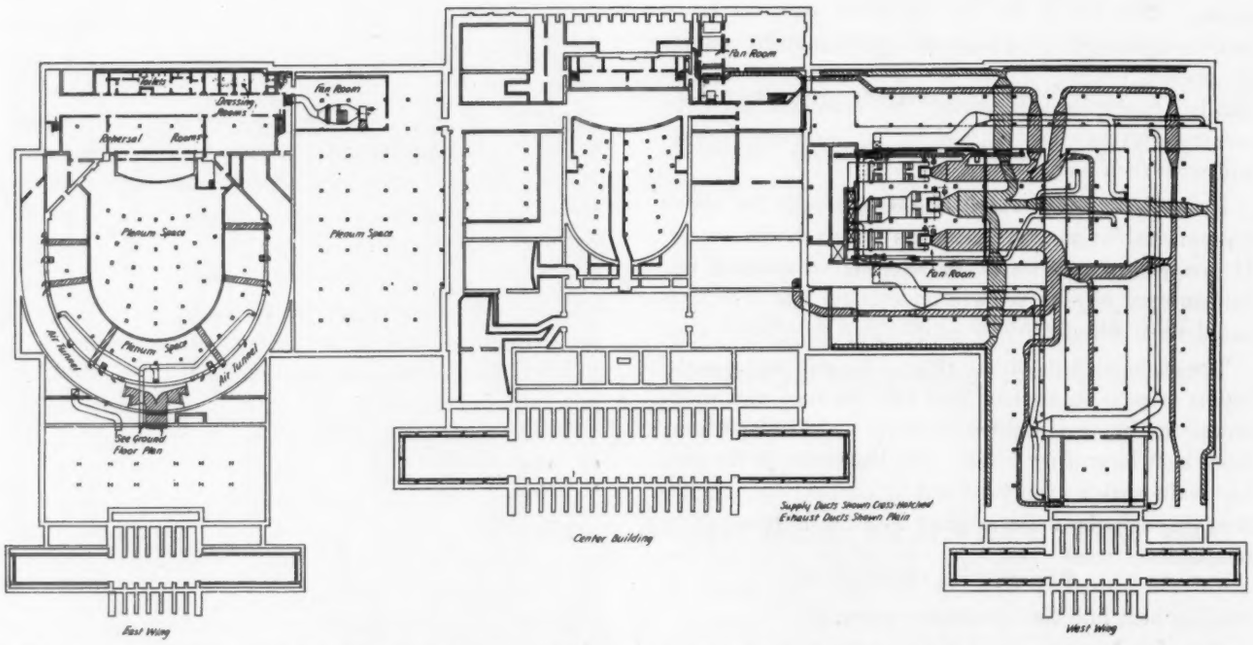
Strictly speaking, of course, in this museum there are ducts above the basement, to bring new air to each room and to carry away the spent air, but they are minimized very nearly to the vanishing point.

A basic stipulation of the design of the heating and ventilating plant was that no pipes which could leak and so by any chance cause damage to priceless museum pieces should be placed in the rooms or even in the walls of the rooms.

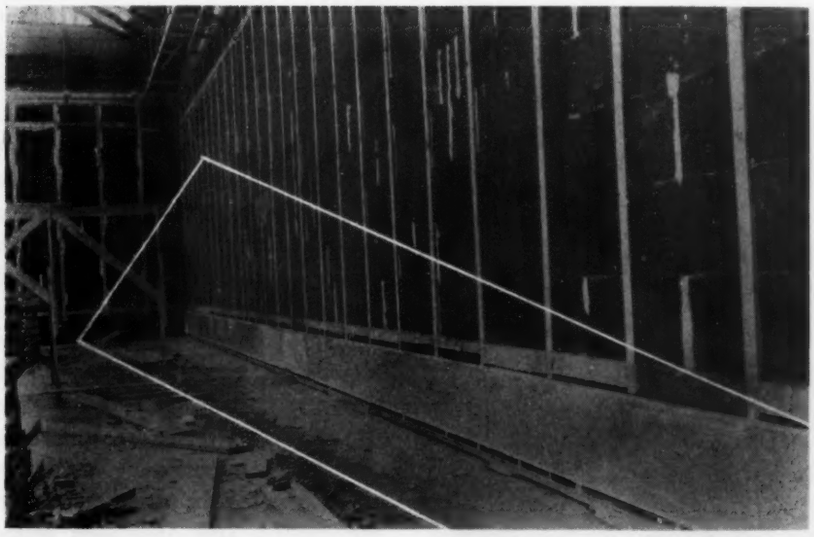
The location of the air inlets and outlets from the museum rooms and from the classrooms of the art school was developed after research and study with full scale models, and after several years' experience of the designing and operating staff with the earlier central portion of the building.

Most museum exhibition rooms have no windows, but are lighted by skylights, and the museum rooms at Toledo are no exception to this rule. In order that comfort shall be conserved in such rooms mechanical ventilation must be provided.

Where mechanical ventilation is provided in museum rooms great difficulty always has been experienced as to the location of the air inlets and outlets.



The center portion was built some years ago. The right hand portion is spoken of as the West Wing. Of the three supply duct systems shown in the West Wing the center one serves the ground story classrooms separately, while the two outer ones serve the museum rooms, including those in the west half of the center building. The two larger exhaust duct systems shown in the West Wing are for the classrooms, while the smaller center exhaust systems is for the toilets. In the left or East Wing the cross hatched ducts indicate the zoned and controlled music hall supply system



A museum wall during construction showing the distributing duct behind the pressed steel wainscot with the horizontally-looking inlet slot at the floor

The wall spaces are all desired for exhibits and registers in them at any level above the chair rail height are objectionable.

The walls usually are hung with neutral-toned cloth which is very susceptible to dust.

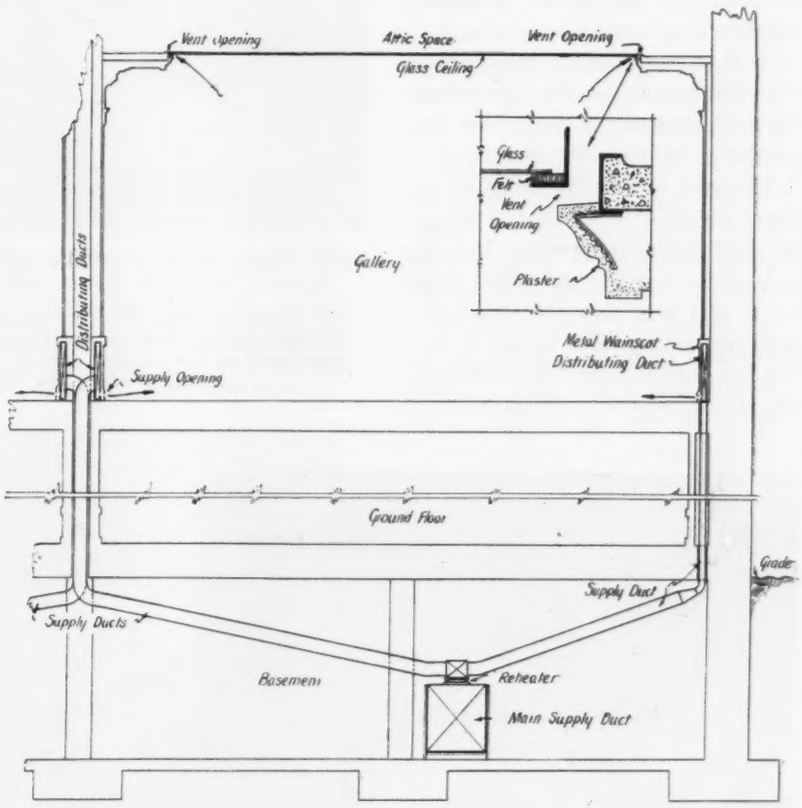
Registers below the chair rail level cause local drafts on anyone who must be near them, and hot air introduced below a painting or any exhibit of wooden or other organic nature may do great damage. Radiators, even when radiators are permitted, cannot be placed alongside any walls.

In the Toledo Museum experience and study showed that for the museum proper the exhaust of air if we were to have effective cooling as well as effective heating, must be at the ceiling, and that it did not matter greatly, where the air entered the room, when we were cooling, as long as we did not blow the air directly against some patron.

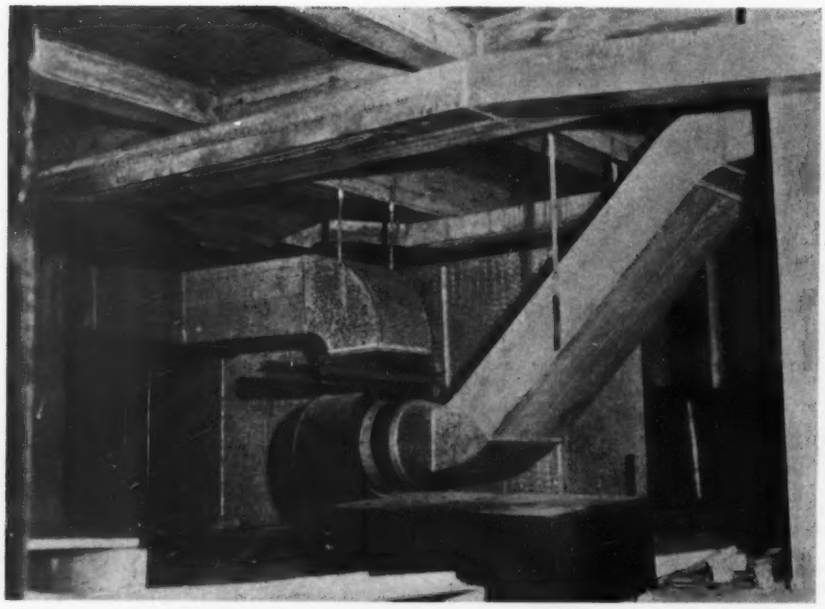
After trying out in actual practice every point of air delivery which we had ever seen or heard of, it was found that a narrow slot close against the floor and as long as the room, on both sides of the room, gave the least objectionable result, in combination with the vent in the skylight ceiling. It was found that when heating, this point of air delivery was not objectionable to patrons. The heat was thrown sufficiently far out from the walls that no high temperature or undue air impact followed for the paintings above the chair rail or for the contents of show cases anywhere in the room. A very definite revolving circuit of all of the room air was set up due to the injector-like effect of the speedy slot air inlet. Since the principal air current due to this revolving cycle was toward the floor rather than way from it as is true with almost all other types of heat and air introduction, there was very little tendency to deposit dust on the walls. This result is in pleasing contrast to that which commonly is seen in the dust above direct radiators and above conventional registers.

A pressed steel combination chair rail, wainscot, mopboard, quarter round and inlet grille was evolved which is used throughout all museum rooms whether or not air is introduced through the grille from ducts behind it.

There are no exhaust grilles from the museum rooms. The spent air escapes through arbitrarily-arranged cracks in the skylights and is carried across the attic as a plenum chamber to the exhaust fans or to the recirculating shafts. This arrangement renders it unnecessary to install radiation in the skylights to prevent condensation.



The basement is reserved entirely for pipes and ducts. The main tempered air duct supplies the 16-foot museum bay with air warmed as required by the hot water reheater shown above it. The steel distributing ducts behind the special wainscot are indicated. The insert shows the exhaust opening at the ceiling leading into the attic



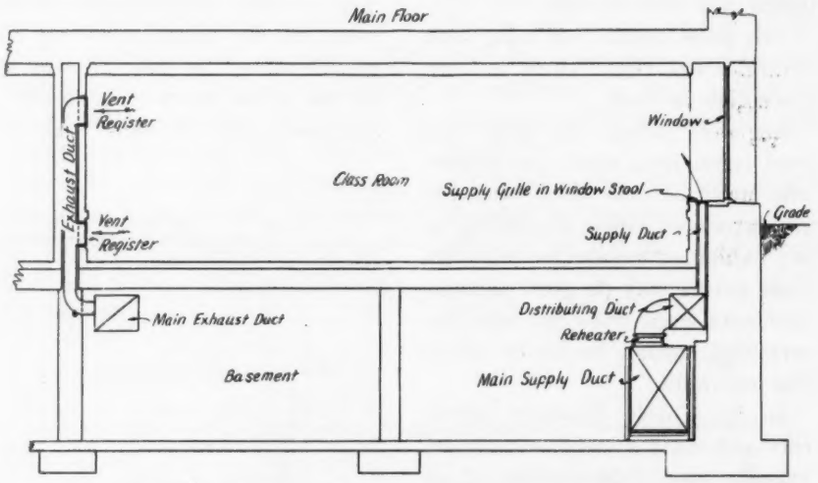
The West Wing toilet exhaust fan with its connecting ducts. In the background some of the copper hot water piping connections to the tempering heaters may be seen

Each sixteen-foot length of museum supply duct is furnished with warm air from a basement reheater separate from the reheater which supplies adjacent sections, so that changing the museum transverse partitions in the future is facilitated.

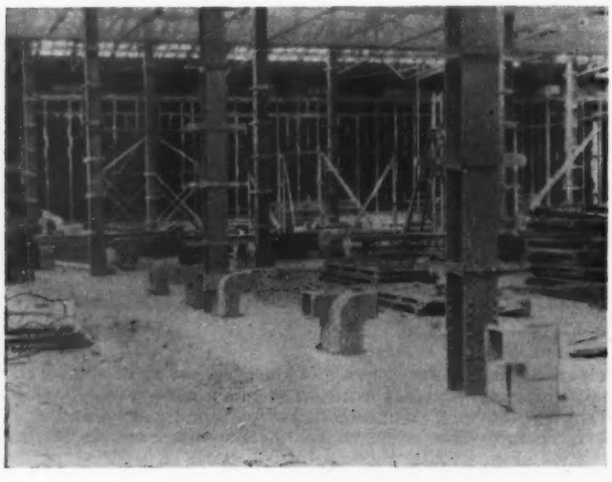
Each sixteen-foot bay has a separate thermostat, or has provision for a future separate thermostat for automatic temperature control.

The cold air supply taken from above the roof is warmed to about 68 degrees by tempering heaters and passes separate automatic dust filters and provision for moisture-changing air washers before it enters the supply fans. These deliver the conditioned air through very large and decidedly lengthy basement trunk lines to local reheaters under the rooms or zones which are to be served. The purpose of these distributed reheaters is so that when the supply fans are not running there shall be some gravity air and heat flow, and is a measure of economy since the air is never warmer than 70 degrees until it enters the comparatively short ducts beyond the reheaters directly under the rooms which it serves.

There are, under the museum rooms of the west wing, extensive classrooms for the art school. These are heated and ventilated independently of the museum rooms, with separate supply and exhaust fans. The air supply for the classrooms enters vertically upward



The main tempered air duct supplies the air to the window stool air inlet through the hot water reheater in the basement. The two vent openings lead downward to the exhaust duct in the basement. A thermostat in the classroom controls the hot water flow to the reheater



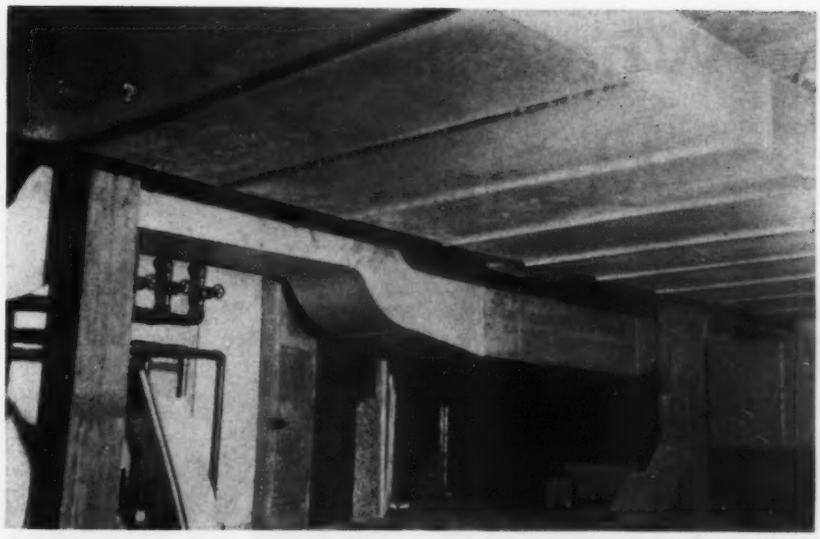
Branch feeders for the partition slotted duct were brought up like this. Duct sections were then seamed into these stubs. On this run back to back ducts for two rooms are provided for

through the window stools and may be vented at the inner end of each room near the floor in winter and near the ceiling in summer.

There are three auditoriums in the building. In all of these the air travel consistently is upward from floor to ceiling, just as it is in the museum rooms. In these auditoriums, which have fixed seats, it is practicable to use floor grilles, generally one under every seat.

There are well subdivided air distributing chambers under the auditorium floor so that the volumes

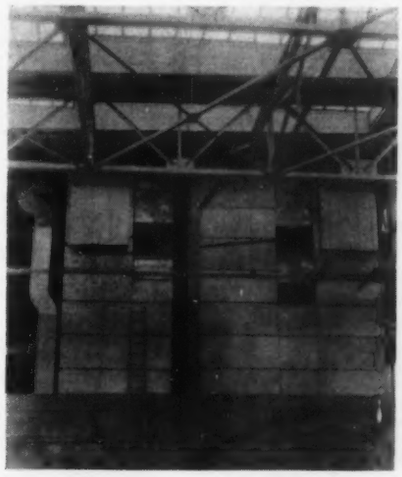
The fabrication and erection of the thousands of pounds of galvanized iron used in the duct work of this interesting installation was done by Fred Christen and Sons Company, Toledo sheet metal and warm air heating contractor. Much of the straight fabrication was made up in the Christen shop but all of the special fittings and much of the duct sections were cut and fit in the museum basement. The photographs show the reinforced and standing seams used as conditions demanded. The wall distributing ducts were fabricated in two sections—a top and front and the back and bottom. The back section was tied into the wall first, then the front section was seamed to the back. Standard ventilation practice was followed for the supply and exhaust ducts, stacks, stubs and fittings.



There are thousands of pounds of galvanized iron in the large supply ducts which fill the basement; so much duct work, in fact, that the entire basement area is given over to the ventilation system. This view, taken near one of the reheaters, shows typical duct fabrication

and temperatures may be zoned.

Two of the auditoriums, one seating 1500 people, have inverted platters for ceilings, which are painted to resemble the sky, and through which no ducts or registers are permissible. While in general downward ventilation is preferable for large auditoriums, reasonable satisfaction has been obtained with well-designed upward systems in rooms like these where no balconies are present and where the floor space bears a large ratio to the heights.



The outside air intake is brought from a roof pent house through the annex like this. The hairpin sections are copper and are designed to catch incoming water and dirt. The remainder of the stacks are galvanized iron.

Heating of the building is accomplished by forced circulation hot water from a central station operated by a public service company. Temperatures are controlled by local thermostats which adjust the rate of water flow by valves rather than to adjust the air temperature by mixing dampers.

Service hot water is heated during winter by transfer from the central station water, but in summer is heated by nine submerged electric heaters. These are well distributed over the building so as to give short circulating lines which are thoroughly insulated. This electric heating of the service water is costing less than did the gas-fired central water heaters which they have replaced.

The gas fires and gas fumes always were objectionable in a building which otherwise needed no open flame. It must be remembered, of course, that the hot water demand in a museum usually is limited to that required for housekeeping purposes.

Some of the supply ducts in the basement of the West Wing near the fan outlets

Where and How Should I Set My Blower Control [Part II]

IN the last issue, February 1, we outlined some of the problems of determining how and where the blower control should be set. This article continues the discussion. If you did not read the last chapter, get the two together and compare your experience with the data here presented.

In poorly designed trunk line systems (too large) the system has been improved by installing a thermostat in the *far end* of the trunk. A majority of the rooms heated by gravity, but those on the far end of the trunk cooled too much before the rear rooms called for heat.

Mr. Olsen of Omaha states that he finds it not advisable to locate controls in pipes or trunks due to the fact if windows are opened a cold *return* draft in the pipe or duct *may* keep the thermostat element cool and not allow the heated air to properly effect it.

The question: "What part of the bonnet do you consider best for the control?" stimulated various answers as will be noted. From the summary we may derive the answer as: "Any where as long as it is in the air flow." However, "gravity" flow and "mechanical" flow may vary extremely in the same heater casing. See Fig. 2. Furnacestats are not difficult to move, and two or more positions may be tested, and with observation the best position obtained. The position may vary on every installation. The contractor should purchase a number of high temperature thermometers. These are glass about ⅛ inch in diameter. With the use of an ice pick or scratch awl a ⅛-inch open-

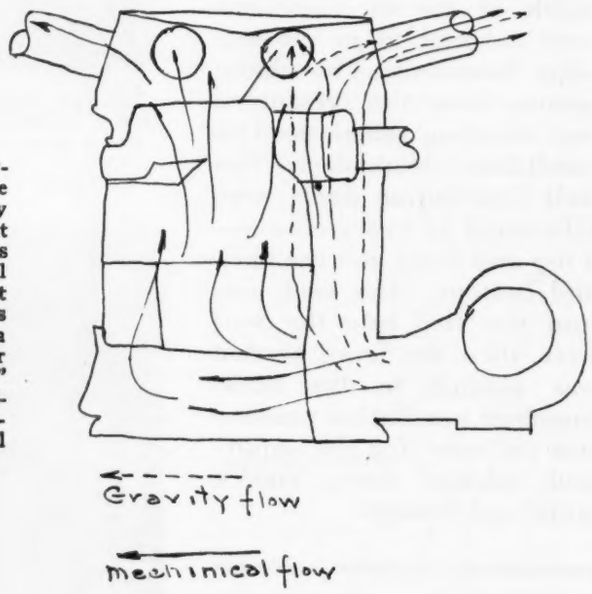
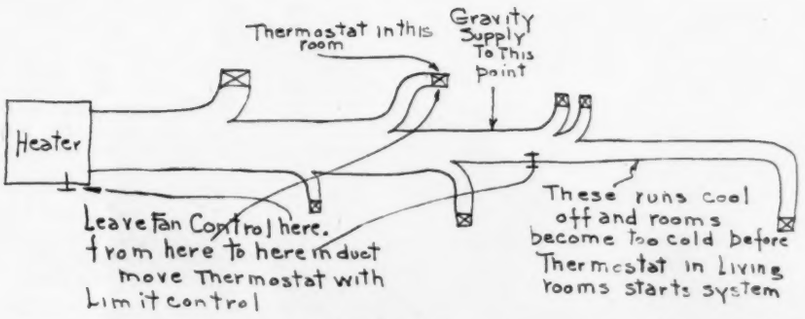


Fig. 2
When a system operates on gravity, the flow of air is in easy sweeps upward, but when the fan goes on a large internal pressure throughout the entire casing is set up. There is a wide difference in air flow and "cold spots" under the two conditions. You must locate your control with this in mind

Contractor	Blower Starts At	Blower Shuts Off At	Control Is Located In	Is The Control Shielded	What Part of Bonnet Do You Consider Best For Control
Jos. Meyer & Son, - Buffalo, N.Y.	135°	115°	Bonnet [1]	No	Varies
W.A. Haberstroh & Son - Omaha	110°	100°	Bonnet	Yes [2]	Center, Side
W.A. Rummel - South Bend, Ind.	175°-250°	125°-200°	Bonnet	No	Front
Trask Heating Co. - Boston	145°-150°	90°-100°	Bonnet	Yes	Side
Kruse Co. - Indianapolis, Ind.	Varies [3]	Same	Bonnet	No	Varies
Schwartz Furnace Co. - Pittsburgh	120°	110°	Bonnet	No	Varies [4]
Ba-Del Co. - St. Louis	250°	200°	Bonnet-Trunk	No	All sides
Freed Furnace Co. - Moline, Ill.	150°	120°	Bonnet	No	Front
G.A. Voorhees - Indianapolis	Varies	—	Bonnet [5]	No	Front
Hunt Bros. - Kansas City, Mo.	120°-150°	110°-130°	Bonnet	No	Front
B.F. John - Philadelphia	175°-200°	140°-165°	Bonnet	Yes	Sides or Back
Olson Bros. - Omaha	140°-175° [6]	120°-145° [7]	Bonnet	Yes	Over Blower Nozzel

Here is a chart on which is plotted typical blower settings by representative heating contractors. Notice what a wide variation there is in the temperatures used. They may all be right, but we don't think they are. The text explains why this chart was made


Thermostat in this room
Gravity Supply To This point
Heater
Leave Fan Control here. from here to here in duct move Thermostat with Limit control
These runs cool off and rooms become too cold before Thermostat in Living rooms starts system

In many systems where the trunks are large an improvement in fan operation may be secured by placing a low limit control in the trunk. This drawing shows several good positions. The main control is left in the bonnet while the low limit control maintains a flow of warm air into the rooms thus preventing a collection of cold air in the trunk. This assists in eliminating "cold 70" and also room stratification

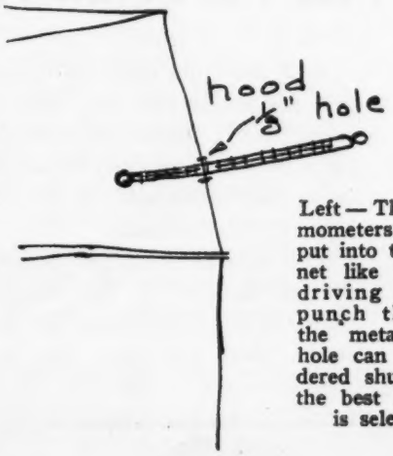
ing may be made and the thermometer inserted in various positions and the readings noted both for gravity and fan service.

After the correct position for the stat has been found, these ⅛-inch openings may be closed with sheet metal screws. These readings should be taken every ten feet of trunk line. In the event of trouble the contractor will know what is going on inside the duct; at least as temperatures are concerned.

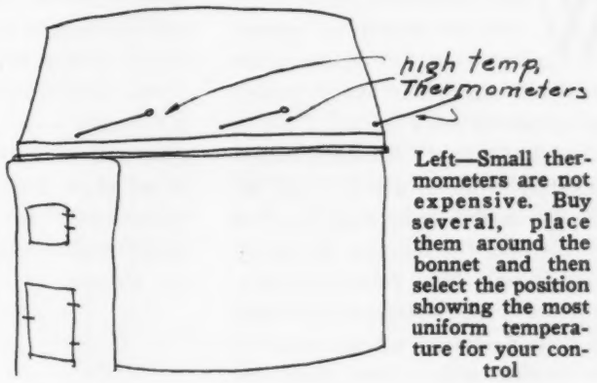
The question: "Is the control shielded" and the answers tend to prove that at least a few of the contractors have tried to combat radiant heat. This question is extremely interesting.

With the hope of starting a controversy that may lead to some interesting data let us say that, "Bonnet controls are effected by radiant heat, but what if they are? Here again the control setting may be no indication of the real air temperature. If the stat is set by test and functions properly what difference if the dial shows 100 or 200 degrees." The reader's reaction to the above will be welcome. Testing instruments in laboratories are protected from radiant heat, but is this necessary on domestic installations?

Certainly the proper location and setting for fan controls requires a minimum of technical knowledge and a maximum of good common sense, plus a few hours of investigation. The more investigation we make the better our future installations will be. Do not neglect a job because it works perfectly or the owner is satisfied. Go back and put in several hours finding out why it works so well. You may be surprised. It may be functioning very differently from what you had assumed.



Left — The thermometers can be put into the bonnet like this by driving a small punch through the metal. The hole can be soldered shut when the best location is selected



Left—Small thermometers are not expensive. Buy several, place them around the bonnet and then select the position showing the most uniform temperature for your control

Conclusions

1. **Locate your blower control in a constantly "warm" spot. Determine this spot by placing thermometers around the bonnet to find where "cold" and "warm" spots exist. This location may vary with the same equipment, but with different location of the blower and different trunk layouts.**
2. **Whether to shield or not should be determined by experiment. If you have radiant heat, either set your control high enough to compensate for this heat or find a location where radiant heat is not effective.**
3. **Determine your "on" and "off" setting from the results you are after. If you want low register temperatures and longer cycles of operation of the fan use a low setting. If you want high register temperatures and short operation cycles use a high setting.**
4. **Don't be afraid to admit you don't know. Experiment and determine your locations and settings for the apparatus you are using and the type of system you are installing.**

A Small Town Business Built On WORD OF THE MOUTH ADVERTISING

WORD of mouth advertising! What potential power there is in those four words, if only their latent power can be put to work.

No doubt every furnace dealer has, at one time or another, put his feet up on the desk, shut his eyes and pictured the business he would enjoy if only Mrs. Jones, and Mr. Smith, and the Brown family would tell their neighbors what a wonderful heating system they have and why John Green is just about the livest and best heating man in his part of the state.

Word of mouth advertising is, advertising and selling authorities agree, the best means of getting business. Mrs. Jones tells her friend about the wonderful system she has and what good service and advice John Green gave them and her neighbor is impressed. John Green might work on this neighbor for months without even securing permission to see her basement. But let a neighbor recommend John Green's service and three-quarters of the battle is won.

How, then, can this powerful sales factor be put to work? Perhaps in several ways, but a method which Belk and Gum in Bowling Green, Kentucky, have worked out is to make every job they install so good and so satisfactory that there is no place for complaint, but so much room for praise that the owner must sooner or later render this tribute.

Belk and Gum claim no recognition for discovering this sales adjunct. As a matter of fact, Mr. Gum says they adopted it only because they were sold on the idea by a visiting salesman.

The idea as developed is based around the use of the Standard Code. In Bowling Green, Mr. Gum states, there has been the usual

Belk and Gum take on all houses regardless of size or construction. In this large house a 35-in. International Heater furnace successfully replaces a system which was not satisfactory. Remodeling the system to meet Standard Code rules brought satisfaction in place of former complaint

Across on the facing page is the Belk and Gum shop, not large, but adequate for the needs of the business of the small community in which this contractor operates. The truck bears the firm name and a catch line telling what Belk and Gum do

This is another house of an old style, often hard to heat, which this firm has found easily heated when Standard Code rules are followed, especially as to return air. This house has 26-inch furnace with lots of return air

amount of hit or miss installations. Installations were skimped in order to knock another ten off the selling price. Even in new installations, corners were cut to save a few dollars, even when the installer knew that the result would not be as satisfactory as he ought to make it.

"Probably," says Mr. Gum, "the situation in our town was no different than the situation in hundreds of other communities. Because we are not a large community, new house construction is scattered and the heating man must depend on repair and replacement business for the bulk of his work.

"About four years ago we came to the cross roads. We were compelled to choose between continuing the same practices followed during past operations, or completely changing our tactics. We chose to change tactics, first because a salesman in whom we have confidence told us that the only way to insure against failure was to make each job so good that the owner would be enthusiastic. We chose to change tactics, second, because we were not making money as the business was then conducted, and third, because the time was ripe for one of the heating contractors to step out with a new line of argument.

"We chose to be the firm which first presented that new line of sales effort."

The change in tactics referred to by Mr. Gum is the adoption of the Standard Code as the basis for figuring and installing furnaces. That this use of the Standard Code has brought business to Belk and Gum is indicated by the various houses shown in which this firm has placed a Standard Code furnace installation.

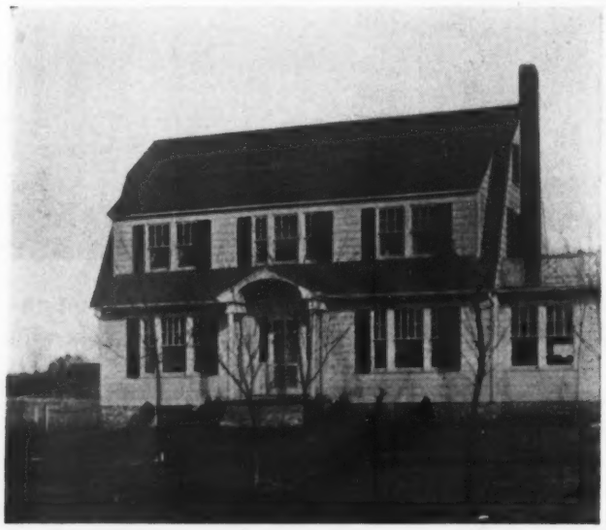
Referring to the change, Mr. Gum says—"About four years ago the Standard Code was lightly regarded by the contractors in Bowling Green. In fact, none of us used it because to follow the code we had to use more metal, more material, larger sizes all the way through, in short do a better job than we were then doing and omit much of the skimping and corner cutting which was taking the profits out of our installations.

"Selling home owners on a code installation was not the easiest thing to do. Folks had been accustomed to other kinds of work for so long that it was difficult to convince them that a more expensive job would save them money in the long run and also give them a more satisfactory system. However, we persisted

Here is a large house of a later period than the one above, which was first heated by an inadequate system. By changing the arrangement of supply and return a great improvement was made in the operation. Also a new International furnace was sold when friends of the owner boosted Belk and Gum service

and month by month found owners willing to listen and take our word that the system we planned would be better.

"We were encouraged in our effort by the knowledge that if we did sketchy work we might enjoy a good run of business for a year or so—in otherwords, until our jobs caught up with us—but that this volume would drop off as first installations failed to give the satisfaction guaranteed.



The little house to the left was figured for a Standard Code installation when it was built. As a result, no trouble has been experienced by the occupants in getting plenty of uniform, humidified heat

"The first thing we did after gaining access to the owner's basement was to check the furnace and if possible try to use it. If the firepot was cracked we didn't try to sell a new furnace, but first tried to make the old one serve with new sections. However, we did check every house against the Standard Code data sheet and when we found that certain rooms did not have sufficient pipe area, that there wasn't enough return air, that the registers were under-sized or poorly located, we explained these points to the owner and attempted to sell him on the idea of altering the system so that when we got through he would have a modern type installation.

"As anyone can imagine, the progress on this missionary work was relatively slow. Naturally, it was hard to sell more expensive jobs until we reached the place where the first jobs began to work for us.

"Many times at first when we were called in to fix broken down plants the owner couldn't understand why we wanted to do anything except move a new furnace into the location of the old one. Customers told us that we had put a new furnace in their neighbor's house and the new plant worked, so why couldn't we do the same for them.

"Under such circumstances we found the Standard Code invaluable in explaining just what constituted a good or a bad installation. Using the charts given us and referring to the information on which the code is based, we found to be the most successful and the quickest way to explain just what we were going to do.

"Owners, we found, are receptive to information which is based on sound investigation and research. Most folks wanted to save money on their fuel bills and also wanted uniform comfort throughout their house. Because we had the basic information necessary to give exactly these results we slowly built up a clientele of satisfied users of our system.

"The most encouraging thing about our program undoubtedly is the word of mouth advertising that soon began to work for us. One satisfied owner told his neighbors about his system. In fact many of them bragged so much about their heating plant that we just had to know what we were doing in order to live up to our growing reputation. If you can call that a handicap, then we had it.

"We feel, however, that such a reputation is not a handicap so long as the installer knows what he should do and then has the courage to stick to his price in order to get enough money to enable him to install the type of system which should go in.

Another new house, of masonry, where code rules provided adequate heat from the very start. Belk and Gum have made such business repeat business by giving so good a system that the owner has to praise his plant to all the friends

"We cannot emphasize too strongly the value of word of mouth advertising. Certainly, in our case, it has meant a growing demand for our services and, even more important, has established us as reputable installers of good systems.

(Continued on page 29)

. . . the problem corner

TWO ROOMS WON'T HEAT

ONE of our readers in the Southeast sends in a sketch of the heating system for a house in which there are two rooms which do not heat satisfactorily.

The installation was made in an old house. All the old registers were used and left in their original locations excepting the servant's room on the second floor, which is in an addition to the house. The original installation used all outside air, but is changed over now, to recirculation.

Here is the situation as our reader describes it.

"Enclosed is rough sketch of a job we recently installed. We had trouble with heating two rooms—the servant's on the second floor and the kitchen on the first.

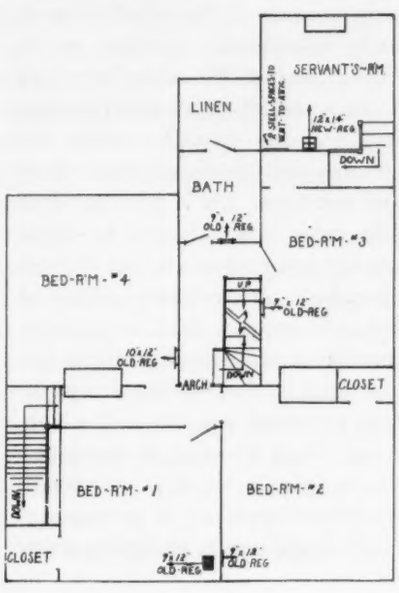
We heated the servant's room by venting to the attic, which relieved the air-bound condition. But, our customer will not leave the doors open leading from the kitchen to the nearest cold air return.

"We wanted to take air from the kitchen where the warm air register is now located, and connect to the bottom of the furnace, and place a new warm air register next to the second floor riser; but our customer objected because he does not want kitchen odors to permeate the atmosphere of the rest of the house. We were to do this without cost to our customer, but since he refuses, he must pay for any other method of relieving the air-bound condition.

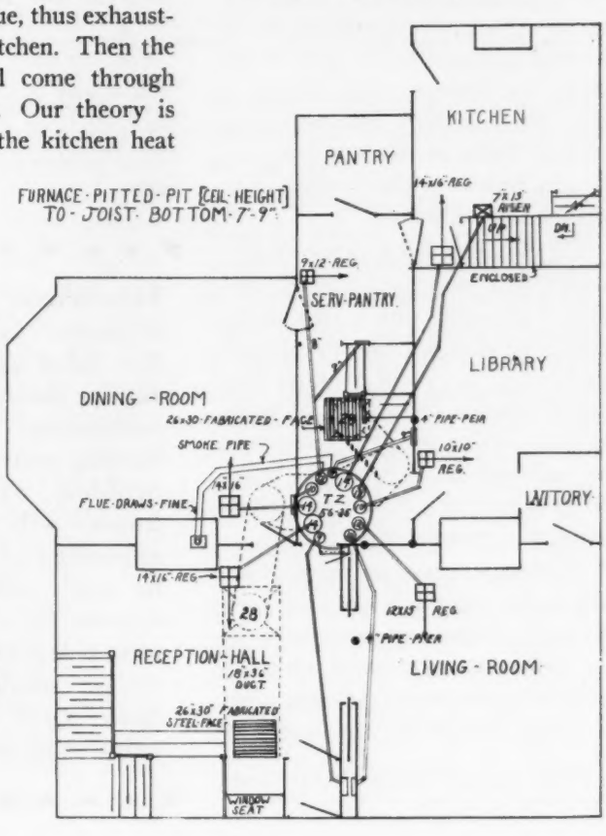
"You will note that we have a possible solution drawn on the first floor plan of the sketch. We propose to use some type of individual pipe run booster inserted in an 8-in. or a 9-in. pipe raised from the floor a few inches and connected to the old kitchen range flue, thus exhausting air from the kitchen. Then the warmed air should come through the warm air duct. Our theory is that not only will the kitchen heat adequately, but that it will eliminate any and all kitchen odors getting into the rest of the house.

"Anyway, we would like to have a discussion in your good journal on this question, since the owner forbids taking return air from the kitchen, and it is impractical, or rather fairly out of the question, to vent the kitchen to the attic. We would also like to see the question of whether or not it is good practice to return air from the kitchen.

"If some of your readers have had experience with individual pipe run booster fans we would like to know whether or not they think such a fan placed in the flue mentioned would exhaust the air from the kitchen into the outside.



At the left is the second floor layout. Poor heating of the servant's room has been overcome by venting the air bound room into the attic At the right is the present layout of the kitchen. The nearest cold air is beyond a door which the owner refuses to let stay open. There is an old flue which may be used to exhaust air. How would you heat this kitchen without recirculating its air through the furnace? The kitchen is 13 x 18 x 11 feet high



Modern residence ventilators are inconspicuous

Ventilation for Residences

By **PAUL R. JORDAN***

THE advantages of ventilation in general are universally recognized. The particular advantages of residence ventilation are well enough known, but are probably not stressed as much as they should be. Residence ventilation is rather neglected.

Certain government tests made on inactive men enclosed in airtight compartments without ventilation have demonstrated that the men under these circumstances can survive for an unbelievable number of hours without apparent harm. Experience shows us, however, that there is a bad effect, possibly cumulative, on persons living or working over extensive periods in places where ventilation is insufficient.

On the other hand, other experiments of a laboratory nature, conducted primarily with a view to ascertaining chemical components and reaction of air, seem to prove that an air change from 5 to 10 times as great as that generally recognized as sufficient is necessary in order to preserve certain inherent characteristics of outdoor air.

The importance of these characteristics is purely a matter of conjecture. Experience again comes in to prove that ventilation which is ordinarily considered sufficient gives a fairly satisfactory condition and enables one to maintain a reasonably good state of health.

We may say in general about ventilation that the more there is the better. It is necessary, however, to establish some sort of standard and that standard has been fixed by a study of hospital and public school conditions at approximately 30 cubic feet of air per minute per person, a reasonable figure.

For purposes of discussion, ventilation may be defined as the bringing in of fresh air from the outside, and removing foul air, hot air and fumes from the inside.

This article was written in response to our request for information on what can be done in residential ventilation. As air conditioning gains poularity the problem of ventilating houses will become more appealing to the owner. If he can't afford a cooling system he can drop evening temperatures by gravity or small fan ventilation. Your questions and comments are invited.

Ventilation of this kind may be divided into three classes: (1) removal of heat, removal of smoke and fumes and (3) furnishing of fresh air. The first two of these are exhaust ventilation; the third is intake ventilation.

One fundamental principle of what might be termed the mechanical or mathematical feature of ventilation is that exhaust and intake must be equal. For every cubic foot of air withdrawn, another cubic foot of air must be taken in; and for every cubic foot of air taken in, another cubic foot of air must be withdrawn.

In residence ventilation (where the rooms are comparatively small and seepage is comparatively great) only one side of this equation needs to be considered. In other words, if you exhaust 300 cubic feet of air from a residence, an equal amount will seep in through cracks and crevices and through opened doors and windows. Or if you introduce 300 cubic feet of air, an equal amount will find its way out through open doors and windows without an exhaust system. It is not usually considered necessary to provide special intakes for residence ventilation, excepting possibly in the bathroom. And where air is being positively introduced, it is not usually considered necessary to provide special exhaust outlets excepting where

**The Paul R. Jordan Co., Indianapolis, Ind.*

they may be advisable to work in with the circulation system of the heating plant.

An exhaust system may be characterized as a low pressure system in which an area of low pressure is created inside the building, so that there is a tendency for outside air to flow in through any possible opening.

An intake system may be characterized as a high pressure system with air, brought in positively, creates an area of high pressure within the building, so that the tendency is for air to flow out through any possible opening. Wind direction and the elevation of the opening of course have their influence, but the tendency nevertheless is as above stated.

All air movements may be stated in terms of pressure differences, both as to direction and as to velocities. In speaking of high and low pressures, I mean relative pressures or pressure differences. The movement of air is always toward low pressure and away from high pressure.

In order to induce an air movement toward a certain point it is only necessary to lower the pressure at that point beyond that of the surrounding pressures. And in order to induce an air flow away from a certain point it is only necessary to increase the pressure at that point beyond that of the surrounding pressures.

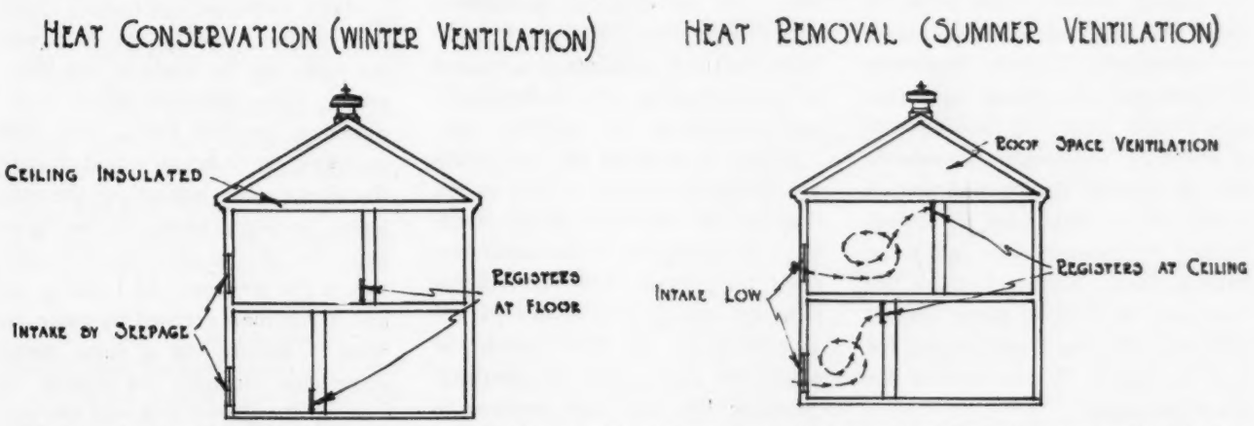
We used to say that vitiated air is heavier than fresh air and that exhausts should be taken from the floor line for that reason. It is not true that exhaled air is heavier than fresh air, excepting in a relative way; in other words, exhaled air of a given temperature is heavier than fresh air of the same temperature. However, exhaled air is not of the same temperature as fresh air.

Experiments made by Sir Douglas Galton indicate that exhaled air of a temperature around 95 degrees is the same weight as fresh air from 78 to 81 degrees Fahrenheit. Therefore exhaled air in a room temperature of 70 degrees will have a tendency to go up, but in a room temperature of 90 degrees it will have a tendency to go down. But room temperatures vary with the height from the floor, so that what the exhaled air actually does is to find its level, which is somewhere between the floor and ceiling. A study of tobacco smoke in a still room indicates that this point is somewhat above the breathing zone. This whole calculation, however, is upset by any rapid diffusion of air, and also by any rapid circulation of air in residences that are properly heated, even where ventilation is neglected.

It is advisable in winter to exhaust from the floor, not for ventilating reasons, but for heating reasons. In summer, however, it is desirable to exhaust from the ceiling in order to remove heat. From a standpoint of ventilation solely, it is somewhat better to exhaust from the ceiling, because fresh air taken in at the floor will constantly push the vitiated air upward, thus keeping the air at the breathing zone always fresh instead of merely diluted. However, the heating advantage of having the exhaust at the floor has much more importance than the ventilating advantage of exhausting from the ceiling during the heating season.

In ventilation for heat removal, the principal element for consideration is the pocket of dead air above the circulating zone. In a roof space without ventilation, the entire roof space becomes a veritable heat reservoir, pocketing the hot air and radiating heat downward long after the sun has set.

In the rooms below, the zone from the tops of the windows and doors to the ceiling forms a dead air pocket from which the hot air has no chance to escape, escepting as it is ventilated. An exhaust ventilator placed on top of the roof and tapping into the roof space will draw off the heated air from the space below. Registers placed in the side wall at the ceiling and emptying into the roof space will keep withdrawing the heated air from the room constantly, making a marked difference in the temperature. Of course, both ventilators and registers should be dampered. Fire stops may be easily worked out by the sheet metal contractor with the use of fusible links.



Many contractors have tried to heat and cool a house with the same set of inlets and outlets. A better method is to have both baseboard and high side wall inlets, with the inlets connected to a ventilation system. In winter use the floor registers, in summer take the hot ceiling air out through the side wall registers. These drawing show the scheme

FAN BLAST ENGINEERING

by PLATTE OVERTON
ENGINEERING EDITOR

VELOCITY AND RESISTANCE

VELOCITY and resistance are two of the unavoidable conditions of air conditioning and mechanical systems that must be met. One may lay too much stress on resistance. Certain engineers and designers are prone to design over sized ducts in an attempt to eliminate resistance. Resistance may be termed the counterpart of taxes, for we must have it. Velocity and resistance may be said to go hand in hand. Seemingly these two items are the bane of many readers who are following these articles, for they constitute 90 per cent of the questions asked.

We may be sure that it is impossible to propel air into rooms without both velocity and resistance. It does not follow that resistance is low because velocity is low. If these two items are not to be evaded, we must spend this energy (for they require energy) for our benefit and in the right place.

The reader should here refer back to the issue of the AMERICAN ARTISAN of September 14, 1931, and check upon resistance or pressure loss. As no duct or mechanical system is without this loss it is obvious that our problem is a matter of proportioning this loss equally and throughout the system. Fig. 14 is an example of the way ducts are sometimes designed. Let us say that the two branches get too much air. The engineer or mechanic who tests the system sets the volume dampers and Fig. 15 shows the effect he gets. In other words, he sized the ducts large to eliminate pressure loss and then returns to the volume damper to create loss.

He may maintain that a large duct has a factor of safety. Guy Voorhees hit the nail on the head when he termed it the "factor of ignorance." "A little knowledge is a dangerous thing."

The designer who sizes ducts to velocities and multiplies the factor "XYZ" in some code to arrive at the diameter of a branch or main saves no time or material, and he may get his fingers burned.

Many warm air contractors claim that the mechanics in the shop will not make up the ducts to the blueprints. They maintain that if I designed a perfect trunk line and branches, the foreman would change the sizes to suit himself or the material, or some whim of the office cat. Of all the alibis on the slate this is the weakest. If I had a job and a foreman refused to make up what I wanted, or a sheet metal contractor changed the design or size of the ducts, I would get another and, moreover, I would refuse to pay for the work until it was correct.

The heating contractor who has this type of shop foreman or the contractor who sub-contracts his sheet metal work and has this type of contractor had better quit the business.

There are warm air contractors who attempt to cure all the consequent ills of a poorly designed system with an over sized heater, others by an over sized fan, still others

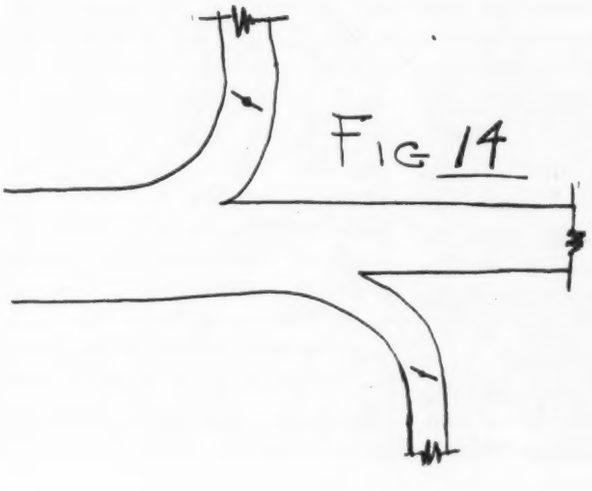
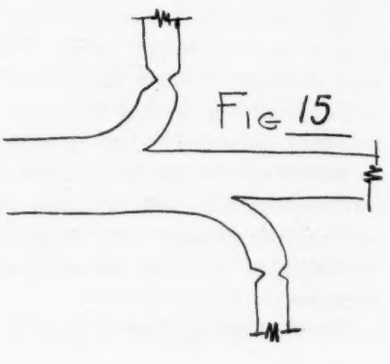


Fig. 14 shows a common method of designing ducts using a volume damper. While this method is better than the use of a splitter the actual result of the system is as though we built built our duct as shown in Fig. 15. Why size the branch too large and then build up the necessary resistance with a damper?



with an over sized duct, or large registers. They have no faith in their own knowledge of what is necessary so they throw in the "factor of ignorance" and collect the last payment as quickly as possible for a mild winter and a phlegmatic home owner.

In an article of August 17 the writer pointed out that it was possible to run a straight duct and stub in the branches without radius elbows or change in trunk size and that some air would get into the various rooms.

It is in line with this statement to say that it is also possible to place a cannonball store inside a sheet iron tank, turned upside down, and connect the top with a register into the living room. One might cut in a cold air with an ax or take all the air from the basement and get some heat. This installation could hardly be termed a warm air system, but it is as much of a warm air system as are some systems now termed "air conditioning installations."

The designer or contractor who knows that his heat losses have been estimated correctly, that his heated, fan and motor are the right size, who has a well designed duct system with his warm air inlets and returns in the correct positions has nothing to fear. His system will function and satisfy.

Velocity is speed of air or the rate of speed being generally in terms of feet per minute. The question of how to calculate the c.f.m. in ducts with a given velocity or the velocity where c.f.m. is given is usually asked the writer by beginners. As it may be vague to some of those who have followed these articles, it will be reviewed at this time.

C.f.m. = cubic feet per hour.

Velocity = velocity in feet per minute.

Velocity is c.f.m. divided by the area of the duct in square feet.

C.f.m. is square feet area of duct times the velocity in feet per minute.

Example—Let us imagine a duct 1 foot square and filled with air, and we will cut this air up in imaginary 1-foot sections. We will now move the air out of the duct and we have velocity. If the air moves at the rate of 1 foot per minute, we have 1 cubic foot of air delivered, or 1 c.f.m. If it moves at the rate of 3 feet per minute, we deliver 2 c.f.m. (Fig. 16.)

These two drawings show the fundamental principles of velocity and c.f.m. If you are not sure you know these principles, follow the problems in the text and see how really simple velocity and c.f.m. are when shown like this. If the text and drawing leave questions in your mind, write us for additional explanation

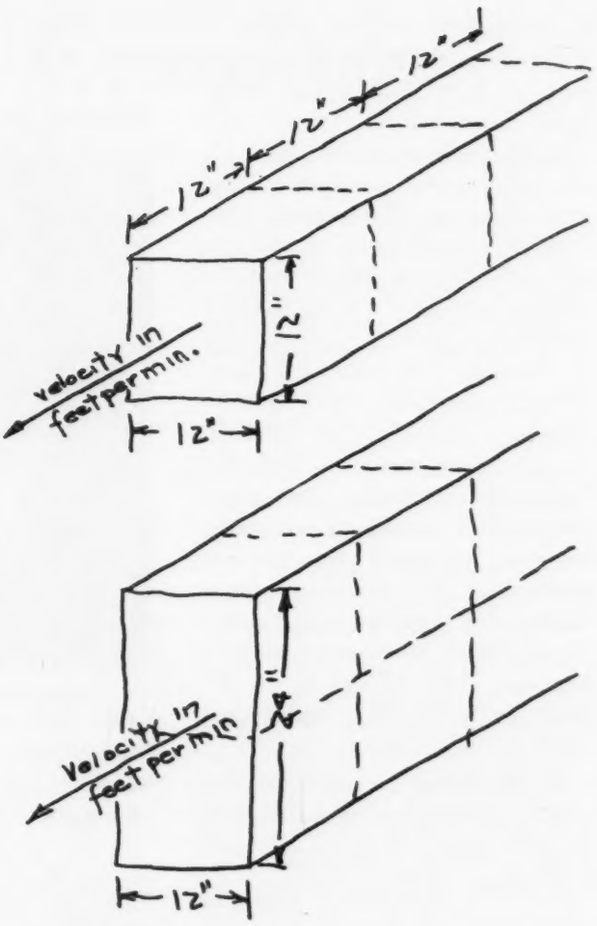


FIG 16

We now imagine our duct 1 foot by 2 feet or 12x24 and we have 2 square feet area. If our velocity is 1 foot per minute, it is obvious that we deliver 2 c.f.m. If our velocity is 10 feet per minute, we have 10 times 2, or 20 c.f.m.

Problem—What is the c.f.m. of a duct 17x17 inches with a velocity of 280 feet per minute? 17x17 = 289 square inches divided by 144 equals 2 square feet approximately 2x280 = 560 c.f.m.

Problem—What is the velocity in feet per minute in a duct 16x20 where the c.f.m. is 600? 16x20 = 320 square inches divided by 144 equals 2.22 square feet; 600 c.f.m. divided by 2.22 equals 270 feet per minute velocity.

Problem—What is the c.f.m. in a round duct 12 inches in diameter with a velocity of 300 feet per minute? To find the square feet of area in a round duct, we square the diameter and multiply by .7854. Our duct is 1 foot in diameter, hence $1 \times 1 = 1 \times .7854 = .7854$ square feet: $.7854 \times 300$ velocity equals 235.62 c.f.m.

We are sometimes given or calculate the square foot of duct necessary and we must reduce this to the equivalent round duct.

Problem—What size round duct must we have to carry 1200 c.f.m. at 300 velocity? $1200 \div 300 = 4$ square feet. Now our rule is: Side of a square $\times$ 1.1284 = diameter

of equal circle. Hence 1.1284 × $\sqrt[3]{4}$ × 12 = 1.1284 × square root of 4 = (2)× 12 = 27-inch round pipe.

Designing ducts to velocities is a slip-shod method and should or may be used only by designers with a wealth of experience. Or as it is a faster method, it may be used for preliminary plans. On the finished or working plans the piping should be carefully checked and such changes made in the piping sizes to correctly balance the pressure losses. Such designers work to "allowable" velocities. The larger the duct the greater the allowable velocity. Designers who lay out hundreds of such systems per year become very proficient at such practice and rarely miscalculate the correct size. Figs. 17 and 18 are offered here as an idea of such design not as a rule to follow.

In calculating pressure loss for piping systems the loss is the sum of the intake loss plus the loss on the longest run or the run with the most resistance. We estimate this loss on the longest duct and create the necessary pressure in the system to overcome this loss. The shorter runs are not calculated in this estimate regardless of their number.

Example—If we supply water to the 20th floor of a building we calculate the necessary pump and pressure loss to get it up to this floor. It is obvious that the other 19 floors will be supplied.

On Fig. 19, the loss should be calculated for the intake duct "F" and the supply duct "E" and the sum of these two resistances is our loss for the piping system.

Designing ducts to velocities should be done only by men who do this type of work day in and day out. For the man who only lays out one piping system a week, designing to velocities too frequently gets him into hot water

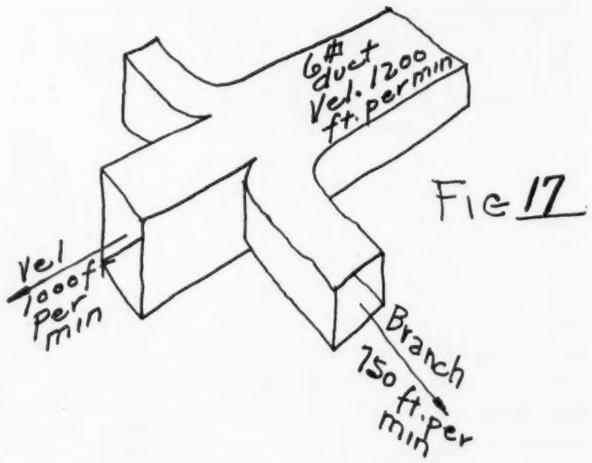


Fig 17

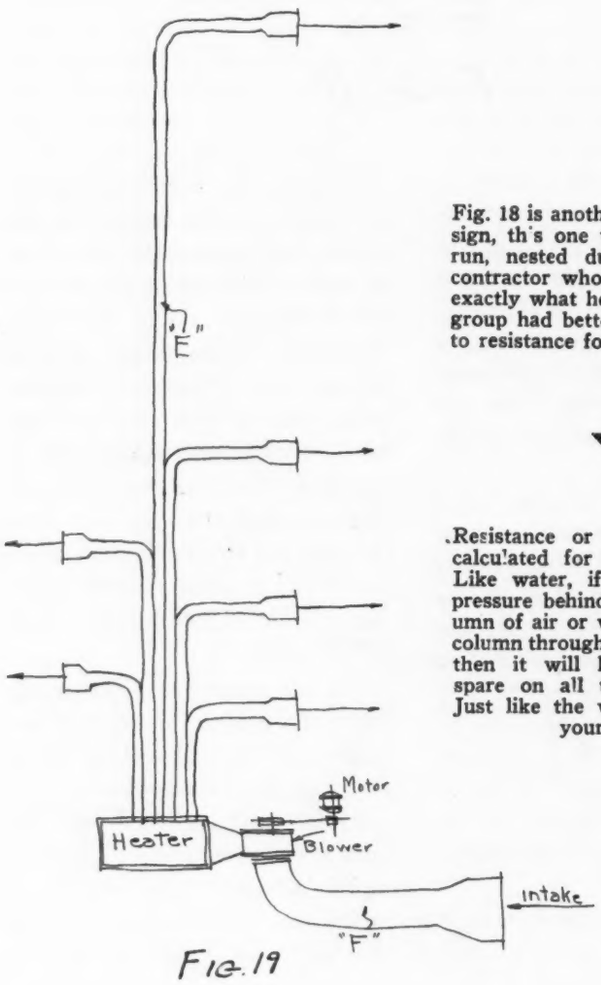


Fig. 19

Fig. 18 is another velocity design, this one with all single run, nested ducts. For the contractor who doesn't know exactly what he is doing, this group had better be designed to resistance for safety's sake

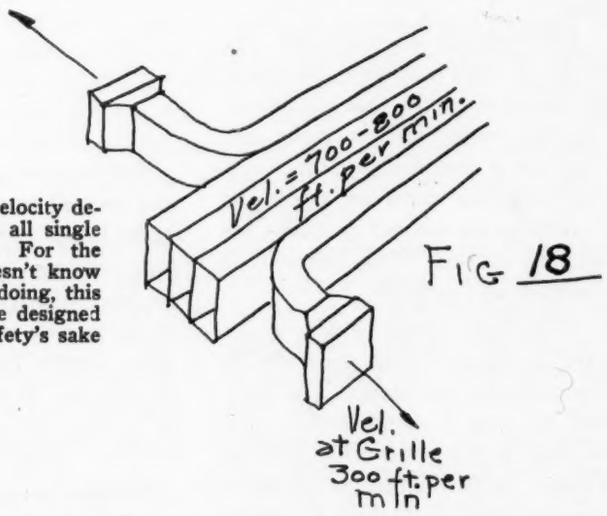


Fig 18

Resistance or pressure loss is calculated for the longest run. Like water, if we put enough pressure behind the moving column of air or water to force the column throughg the longest run, then it will have pressure to spare on all the shorter runs. Just like the water pressure in your house

The balance of the runs should be designed in size for the same resistance as "E" or volume dampers installed to make the equivalent pressure loss.

The article following this will tell and show where resistances develop, how they are accounted for and the relation of resistance to velocity and areas—Editor

The Wisconsin Convention

WITH an attendance greater than that of 1931 and a registration of exhibitors and firms also above 1931, the 1932 convention of the Wisconsin Sheet Metal Contractors' Association was held in Milwaukee, February 1 and 2. The program arranged for the meeting was planned to stimulate thought and bring messages from authorities in each particular line of activity. How well this program met contractors' approval was indicated by the two days' sessions which were fully attended.

Business

The officers elected to serve for the coming year are listed in an adjoining column. Of particular interest this year was Treasurer Alfred Goethel's report which showed a larger balance in the treasury than last year.

Henry Pluckhan, chairman of the membership committee, reported that about 15 new members had joined the association this year. Palmer Hanson, chairman of the Trade Relations Committee, reported that several controversial issues had been settled, especially the trouble in LaCrosse over who should sell corrugated sheets. In LaCrosse the sheet metal contractors together with the manufacturers of sheets were successful in taking this business away from the lumber yards.

Paul L. Biersach, secretary, brought before the convention a bill compelling general contractors to submit with their bids the names and bid prices of all sub-contractors. This is a bill similar to the resolution presented and adopted by the Indiana state association.

Monday

In opening the convention Monday morning, Arnold Holming, president of the Milwaukee local, made the statement that the sheet metal business has fallen into a state of decay mainly through a lowering in workmanship because of a poorer class of mechanics and poorer installations because of the prevalence of price cutting. "The only method out of this trouble," he stated, "is for contractors to get together on better prices, insist on good workmanship and hire or train only competent mechanics."

Paul R. Reed

The first speaker of the program was Paul L. Reed, editor, Warm Air Heating, St. Louis, who talked on "The Trade Paper and Dealer Education." This address was identical with the one given at the Indiana convention and reported in AMERICAN ARTISAN of February 1.

R. G. Suettinger, President

J. C. Miles

"Jimmy" Miles of the Warm Air Furnace Fan Company, Cleveland, talked in the afternoon on "Air Conditioning the American Home." The important points of this talk were—that the warm air heating industry is now ready to give the public any degree of air conditioning desired. That our manufacturers now have all the apparatus such systems will use; that this apparatus has been pretty well developed to supply the results needed and wanted; and that co-operation between manufacturer and dealer will determine just how far our industry can and will go to develop the great air conditioning market which authorities tell us lies just ahead.

The speaker also emphasized the point that the American public is easy to sell on any product or system which means increased health and comfort.

"The same situation," said Mr. Miles, "now confronts us as confronted other industries when they first planned their selling campaigns. It is up to us to see whether air conditioning will remain a furnace product or be taken from us by other existing agencies or entirely new agencies which will spring up if we lose our grip."

Platte Overton

Platte Overton, engineering editor, AMERICAN ARTISAN, talked on merchandising air conditioning. He said in brief:

"The question, 'What reason have you to believe that the average man will ever pay $600 to $1200 for an air conditioning system in his home?' is frequently asked the speaker.

"Now the ultimate consumer had nothing to do with setting the price. As a whole, he does not know if a gravity furnace installation is worth $150 or $300. He comes to the contractors to buy comfort, warmth, health and happiness. This home owner is not interested in grates or castings or sheet steel. Codes, charts, warm air association and B.t.u.'s mean nothing to him, so the contractor talks to him about them.

"The befuddled home owner listens for a day or two and not having the faintest idea of what it is all about, buys the furnace at the lowest figure submitted.

"If I were to call on a prospect today and tell him the story of air conditioning, I should like to leave him some piece of literature to carry on my story after I had left. It would not be a catalog, but a simple folder, say 9x15 or 16, with a full story in pictures presented to him when he opened it up. It would show the corner of a living room well decorated with radiators where available space should be. The walls would show the black streaks of a winter's heating and a $150 chair about to fall to pieces. The curtains and drapes would be shrieking for a trip to the cleaners, and the rugs begging to be taken to the cleaning shop, where they return with five years removed from their lives.

"Then the picture of the solution. No radiators, small, inconspicuous openings under the windows or high in the side walls, clean wall drapes and rugs, no dusting to do, no bills for redecorating for years. The picture of a living room with a bridge table and four players with their coats on. Ninety-five degrees outside, 80 per cent relative humidity, 75-80 degrees inside, 40 per cent relative humidity.

"A few well-chosen words comprehensive to the owner about health, heat, humidity, remarks about the appeal to the housekeeper who must keep this home clean. No dust, dirt or odors. The cost? Point out that he spends $700 to $3000 per year for automobiles, $1500 for tile work in bathrooms where we spend not to exceed one hour per day, $300 to $3000 for a fireplace, used ten times per year at the most, $1000 to $9000 for a roof, $5000 to $50,000 for furnishings. The air conditioning plant he can use 24 hours a day, 365 days per year."

R. S. Schmieder

A very interesting address was given by "Bob" Schmieder of Super Steel Products Company, Milwaukee, on sheet metal as an industry. After briefly outlining the history of the sheet metal industry, particularly the branches of skylights, metal ceilings and cornices, he pointed out that these three branches of the craft are still

1932 OFFICERS

PRESIDENT

R. G. Suettinger.....Two Rivers

VICE-PRESIDENTS

George Bishoff.....Marinette
George C. Peterson.....Manitowoc
John Birthrong.....Waukesha
Adolph Schumann.....Milwaukee
C. F. Goldstone.....Menominee, Mich.

SERGEANT AT ARMS

A. J. Stiegler.....Neenah

SECRETARY

Paul R. Biersach.....Milwaukee

TREASURER

Alfred C. Goethel.....Milwaukee

large factors in the profits of our industry. "Most contractors' records will show," he declared, "that these applications of sheet metal still account for a large share of the profits we get from our individual businesses. And this in spite of the fact that cornices have suffered at the hands of competitive materials; skylights must be actively sold, and this we don't do, and that metal ceilings are an application most of us sidestep because we are too lazy to get out and solicit ceiling business."

W. S. Hays

The first speaker Tuesday morning was W. S. Hays, secretary, National Slate Association, Philadelphia. One of the striking statements made by Mr. Hayes was—"The roofing industry for 1932 will be a $200,000,000 industry." He also declared that of this sum more than $70,000,000 would go into metal roofing and the balance into all other types. These figures are for materials only and when labor and profit is added the amount spent for roofing in 1932 will exceed $500,000,000.

Another interesting assertion was that roofs are on the way to becoming a more important architectural feature of every building, especially the house. The public has become aware of the fact that some types of roofs are especially adaptable to certain styles of architecture and that metal roofing will greatly benefit from this trend.

C. K. Sanborn

C. K. Sanborn, district manager, Ludowici-Celadon Company, Chicago, gave a very instructive and interesting talk on the history of tile roofing from the days of the glory of Greece, Athens and Rome and explained how the beautiful tiles of those early periods are now reproduced by machine methods in such other materials as concrete.

A. W. Bergman

A. W. Bergman, building materials sales manager, northwest district, Johns-Manville Corp., explained how by straight percentages, roofing work can be secured by door to door canvassing. "In a town of 5,000," he said, "there are at least 800 houses. Statistics show that out of any 800 houses at least 78 houses require new roofs or repair work every year.

"The owners of these 78 houses will not call in a roofer until the roof begins to leak, and then the damage may be done. A good canvassing crew should be able to turn up these prospects by asking how long since repairs were made or by simply looking at the roof.

E. E. Besser, Jr.

The importance of publicity for any firm whether sheet metal or roofing, was discussed by E. E. Besser, Jr., president of the National Roofing Association, Chicago. He explained how all business must bring its name before the public these days and the more unusual or more interesting the method used, the quicker the name impresses itself on the public. Two of the methods he said had been used successfully in roofing work were—placing your name and advertising on small paper kites which are given to the children to take home, also placing a small metal tag on each job you do. This tag should be permanent.

D. T. Haddock

D. T. Haddock, American Sheet and Tin Plate Company, Pittsburgh, gave a very interesting talk on "Tin Roofing." Perhaps the most striking assertion of his address was the statement that sheets with an 8-pound coating were no good for roofing purposes. That a 20-pound coating should be the absolute minimum coating used for roofing and that a 40-pound coating ought to be used.

While he declared he held no brief for any paint manufacturer, the fact remains that a tin roof is no better than the paint which protects it. Many contractors use black paint which is, he declared, absolutely no good for roofing purposes. Red oxide mixed in linseed oil should be used.

His talk preceded a moving picture showing the history and manufacture of tin plate.

Social

The ladies of the attending members were well entertained by the ladies' auxiliary entertainment committee. The annual banquet was staged Tuesday evening and proved a lively and enjoyable affair with good dance music and entertainment.

Regarding the social activities a word should be said for the entertainment provided by the various firms reserving special rooms during the convention. Running true to Milwaukee and Wisconsin hospitality, these get togethers provided plenty of refreshment and jollity.

Manufacturers Displaying at Wisconsin Hardware Show

American Zinc Institute, New York—Miniature home showing beauty and permanency of galvanized roofing; special educational matter explaining the "Seal of Quality" brand on galvanized sheets.

Barnes Metal Products Co., Chicago—Full line of conductor pipe and fittings.

Bergstrom Stove Company, Neenah, Wis.—Furnace fittings and cast furnaces.

Excelsior Steel Furnace Co., Chicago—Furnaces; stove and furnace fittings; Hart & Cooley registers.

Graff Furnace Co., Scranton, Pa.—Furnaces.

Heil Company, Milwaukee, Wis.—Combustion oil burner.

Lennox Furnace Co., Marshalltown, Iowa—Steel, coal and gas fired furnaces; Aire-Flo Air Conditioning Unit.

Minneapolis - Honeywell Regulator Company, Minneapolis—Heat Regulators; Electric Janitor, Time-O-Stat Controls.

Morley-Murphy Company, Green Bay, Wis.—Monitor-Caloric furnaces; Ben Franklin oil burners.

L. J. Mueller Furnace Co., Milwaukee—Mueller-Sturtevant Climator; full line of coal and gas furnaces for gravity and forced air installations; grilles.

Midland Furnace Co., Columbus, Ohio—Midland and Success steel furnaces and complete air conditioning unit.

Milcor Steel Co., Milwaukee—Complete line sheet metal products including metal ceilings, side walls, ventilators and other building products; furnace pipe and fittings.

Premier Warm Air Heater Co., Dowagiac, Mich.—Premier Weatherator air washing and air conditioning unit; Premier cast and steel furnaces.

Richardson Mfg. Co., Sheboygan, Wis.—Richardson System with forced draft and air circulation combination.

Round Oak Furnace Co., Dowagiac, Mich.—Round Oak coal and gas fired furnaces; complete air conditioning unit.

Rybolt Heater Co., Ashland, Ohio—Furnaces.

Schwab Furnace and Mfg. Co., Milwaukee—GiltEdge furnaces, Rock Island registers, Handy furnace pipe, complete unit with Sun-Ray Heat distributor and humidifier.

Speich Stove Repair Co., Milwaukee—International furnaces.

Waterman-Waterbury Co., Minneapolis—Steel furnaces for both gravity and forced air.

CAN YOU TELL ME ?

Bumping Hammers

From Ralph W. Poe, Canton, Illinois.

Where can we get bumping hammers?

Ans.—Interstate Machinery Company, 130 South Clinton, Chicago, Illinois.

—o—

Humidifiers

From Melbye Brothers, Inc., Chicago, Illinois.

Who manufactures humidifiers for warm air furnaces?

Ans.—Refer to Buyers' Directory.

—o—

Stamped Steel Ornaments

From B. Ungar & Sons, McKeesport, Pennsylvania.

Where can we get stamped steel ornaments suitable for radiator enclosures?

Ans.—Milcor Steel Company, Milwaukee, Wisconsin; Gerock Brothers Manufacturing Company, 1252 Vendeventer Avenue, St. Louis, Missouri.

—o—

Electric Air Compressor Repairs

From Rogers Sheet Metal Shop, Chillicothe, Illinois.

Where can we get repairs for an electric air compressor?

Ans.—Lammert & Mann Company, 221 North Wood Street, Chicago, Illinois.

—o—

"Lackawanna" Heater

From Metzner Stove Repair Company, Kansas City, Missouri.

Who manufactures the No. 122 Lackawanna Heater?

Ans.—Scranton Stove Works, Scranton, Pennsylvania.

—o—

"Cabco" Radiators

From Grover C. Smith, Erie, Pennsylvania.

Who manufactures "Cabco" gas steam radiators?

Ans.—Cabco Iron Works, 7 Palmer Street, Gowanda, New York.

—o—

Monarch Metal Weatherstrip Company

From the Kalamazoo Stove Company, Elyria, Ohio.

Where is the Monarch Metal Weathstrip Company located?

Ans.—1344 West Washington Boulevard, Chicago, Illinois.

Furnace Vacuum Cleaners

From Putnam Supply Company, Peoria, Illinois.

Who manufactures furnace vacuum cleaners?

Ans.—Refer to Buyers' Directory.

—o—

Gas Conversion Burners

From Henson Robinson Company, Springfield, Illinois.

Who manufactures gas conversion burners?

Ans.—List mailed.

—o—

Furnace Fan

From Pioneer Heat Regulator Company, Dayton, Ohio.

Who manufactures furnace fans?

Ans.—Refer to Buyers' Directory.

—o—

McKinney Tool & Manufacturing Co.

From Porbeck Manufacturing Company, St. Louis, Missouri.

Where is the McKinney Tool & Manufacturing Company located?

Ans.—16800 Arabella Avenue, Cleveland, Ohio.

—o—

Oil Burners

From Ryniker Sheet Metal Works, Inc., Billings, Montana.

Who manufactures oil burners for warm air furnaces?

Ans.—List mailed.

—o—

Aluminum Solder

From L. E. Miller, Goodland, Indiana.

Who manufactures aluminum solder?

Ans.—Aluminum Company of America, Oliver Building, Pittsburgh, Pennsylvania.

—o—

"Sun-Glow" Gas Heater

From E. M. Meyer, Palmyra, Missouri.

Who manufactures the "Sun-Glow" gas heater?

Ans.—Sunbrite Manufacturing Company, Mansfield, Ohio.

—o—

"Eclipse" Boiler

From Mr. Heeter, Chicago, Illinois.

Where can I get an "Eclipse" boiler?

Ans.—Davies Supply Company, 6601 West Grand Avenue, Chicago, Illinois.

Plumbing and Sheet Metal Correspondence Schools

From Arlie E. Roberts, Greybull, Wyoming.

What schools give a course by mail on sheet metal and plumbing work?

Ans.—International Correspondence School, Scranton, Pennsylvania; New York University, 181st Street and University Avenue, New York City.

—o—

Fire Brick in Indiana

From Julius Hauser & Son, Evansville, Indiana.

Who in Indiana manufactures fire brick?

Ans.—Burns & Hancock Fire Brick & Clay Company, Montezuma, Indiana; Hydraulic-Press Brick Company, 802 Board of Trade Building, Indianapolis, Indiana; Uhl Pottery Company, 509 North West Fourth Street, Evansville, Indiana.

WORD-OF-MOUTH ADVERTISING

(Continued from page 20)

"We are not and do not plan to be, in the big city sense, large installers. We couldn't be in the first place because the size of our community doesn't warrant it. Neither do we claim to have a corner on all the furnace work in our city. But we do know, and without bragging about it, that the jobs we have done in the last four years will stand strict investigation and that if you were to walk down our main street and ask a dozen persons chosen at random where you can buy a good furnace installation or get sound advice on heating we would get our share of the replies.

"We have staked our business on good installation. In order to give good installations we have, in turn, made use of the code as a guide. In spite of business conditions as they exist today we have nothing to regret.

"Good installations bring word of mouth advertising and in our case that has meant profitable business."

New PRODUCTS

Kelsey Announces New Type "R" Generator

The Kelsey Heating Company, Syracuse, N. Y., announces a new unit, known as the Type "R" Kelsey Warm Air Generator for which advanced construction and design are claimed.

Among the features of the new unit are—design so that all the products of combustion come in contact with extensive heating surfaces, improvement

of the company's sectional fire cylinder, more air travel areas and changes to adopt the unit to forced air work.

All of these features are completely described and discussed in a new booklet which can be had from the company. Each feature is taken up in order and by the use of drawings, photographs and text fully described.

In addition to a description of the new heater, there are also chapters devoted to discussion of houses and rooms "hard to heat," how humidification is maintained automatically, use of furnaces in battery for large structures, forced air applications and apparatus.

The Kelsey company has also published a revised copy of the folder describing the Kelsey-Bradley Conditioned Air Unit. This folder is also available for contractors.

Three-Day Short Course in Forced Air Design

There will be given in East Lansing, Michigan, March 22, 23 and 24, a three-day short course in forced air design sponsored by Michigan State College. The course will be given under the chairmanship of Professor Lorin G. Miller of the college.

The cost of the course will be very nominal—$5.00. This covers all costs, including the registration fee, a banquet ticket, a free psychrometer and all the instruction planned.

The course will be eminently practical throughout and will be carried out by practical instructors and men from the warm air heating industry.

Registration should be made early. Make your reservation to Prof. Miller, care of Michigan State College, East Lansing, Mich.

The program as now outlined is as follows:

"Importance of Analyzing Building Structure."

"Use of Coefficients of Factors and How to Find Them."

"Infiltration and B.t.u. Methods of Calculation."

Lecture and discussion by H. B. Huffaker.

"Duct Design and Layout." Lecture and discussion led by Fred R. Bishop.

"Air Flow." Lecture and discussion led by Jay Barton.

"Air Conditioning," "The Comfort Zone," "Humidity," "Air Washing," "Filters," "Cooling." (Speakers to be announced later.)

New "Clamp-On" Connector for Piping

Sallada Manufacturing Co., Inc., Minneapolis, Minn., announce a new "clamp on" connector which is especially adaptable for making connections

between humidifying apparatus and city water lines.

The unit is made like a common "C" clamp and is adjustable to three different sized pipes, namely ⅜-inch, ½-inch and ¾-inch. All that is necessary when installing this connector is to locate the place where you wish to make the connection and drill a $\frac{7}{16}$-inch hole in the water pipe, hook the clamp over the pipe and screw the stem up allowing the tapered point to enter the hole and with a pair of pliers or wrench tighten the stem up until it is well seated in the pipe then tighten the set screw in the side of the clamp and the job is done.

The opening in the lower end of the stem is tapped to receive any valve having ⅛-inch standard pipe thread or can be connected with ⅛-inch standard pipe if desired.

This connector has no gaskets or washers to become hard and crack thus causing a leak, but the soft metal point seats itself into the pipe and is forever tight.

Literature on the new product can be had by writing the company.

Ohio Announces Annual Convention Program

The Ohio Sheet Metal Contractors' Association will hold its annual convention in Akron, February 23, 24 and 25. Headquarters will be at the Mayflower Hotel.

Among the important events and addresses listed for the program will be the following:

Trip to plant of the Goodyear Zeppelin Corporation to see the biggest sheet metal job in the world under construction. Cars will leave from the main entrance of the Mayflower Hotel.

Stag Party at the German-Hungarian club. Guaranteed to make you forget the depression.

Address by D. M. Strickland, The American Rolling Mill Co.

Address by Prof. Wm. L. Davis on "Where Do We Go From Here."

Address by D. C. Rybolt on "The Bright Lights."

Address by T. R. Walker on "Legislation in Ohio with Reference to the Sheet Metal Industry."

Frigidaire Making Air Conditioning Units

Frigidaire Corporation has entered the air conditioning field with a diversified line of individual unit-type conditioners suitable for such commercial establishments as offices, shops,

residences, apartments. The units were first made known at Cleveland to members of the American Society of Heating and Ventilating Engineers and of the American Society of Refrigeration Engineers.

The equipment is designed to lower the relative humidity on hot, sultry days, and in winter, when the heated air becomes dry, will add moisture. Fans deflect and diffuse the air throughout the room adding to the heating and cooling efficiency of the installation.

The air conditioner, enclosed in a walnut or mahonany cover adapted to modern home and office furnishings, may be installed in place of the conventional hot water, steam of vapor radiator.

All models have spiral finned copper tubing cooling coils, and the V-4 and H-4 models have spiral finned copper tubing heating coils.

The H and V models are equipped with centrifugal fans powered by one-twentieth horsepower motors. The air movement in the V models is at the

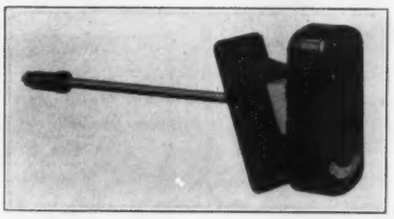
rate of 450 cubic feet per minute, in the H models at 550 cubic feet per minute, and in the S model, which has a bladed fan instead of a centrifugal fan, is at the rate of 585 cubic feet of air per minute.

Frigidaire compressors, rated at one and a half horsepower are used for individual installations. The compressors are available for all cycles and voltages of current.

In cold seasons, the refrigeration unit becomes inoperative and the heating coil, connected to the owner's existing hot water, vapor or steam heating system, begins to function. The heated air is moistened by dissipation of water from the humidifier, and is sent into the room by the centrifugal fan.

New Limit Control

A three-terminal furnace Limit Switch for use in conjunction with a low-voltage regulator on warm air installations, has recently been developed by Barber-Colman Company of Rockford, Illinois. The limit switch may be used alone as an operating control, or may be used in connection with a standard room-type thermostat, as a cutout for excessive furnace tempera-



tures. When used as a cutout, the switch is a reliable safety control, protecting the furnace, and conserving fuel.

The unit consists of an adjustable switching mechanism in a box, to the back of which is fastened a long tube carrying a bimetallic helix. Within this tube is a rod which links the free end of the helix with the contact tongue of the mechanism. Detent magnets are employed on either side of the contact tongue, eliminating any operating errors due to vibration, and making a neutral switching position impossible.

The switch may be mounted on the bonnet of practically any furnace.

The switch may be adjusted to change at any limiting temperature between 100 deg. and 400 deg. F. The construction of the switch provides that a drop in temperature of 60 deg. must take place in the bonnet after the switch has changed from the limiting contact, and before the switch will again return the control to the limiting circuit. This differential is constant for all temperature limits.

Motor Wheel Corp. and Quaker Mfg. Co. Form Cross License Agreement

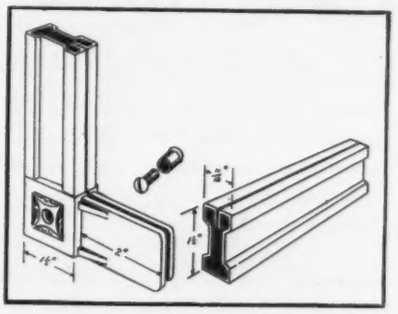
The Motor Wheel Corp., of Lansing, Michigan, and the Quaker Mfg. Co., of Chicago, Illinois, announce that a cross licensing agreement has been effected with respect to the Valjean and Breese Oil Burner patents. These patents relate to a process of combustion and the apparatus for practicing that process. The apparatus is commonly known as the carburetor type of burner. It is understood that a concerted effort will be made to prevent the unlicensed use of these inventions.

The Quaker Manufacturing Company has been a licensee under the Breese patents which they have used in manufacturing the Quaker Burnoil radiant and circulating heaters, while the Motor Wheel Corporation under the Valjean patents has been manufacturing oil burning utilities.

The Manufacturing Division of the Quaker Manufacturing Company has been transferred from Chicago Heights, Illinois, to Lansing, Michigan.

Sheet Metal Frames

A patented construction of ornamental metal frames is being introduced by the Universal Frame Company of Chicago. Using only four special screws which are supplied with the corner pieces, a sturdy and orna-



mental frame may be applied to any size of sheet metal panel using only a hacksaw and screw driver to do the job. Universal frame parts were designed to supply the sign trade and outdoor advertiser with ornamental metal panels at low cost to replace old type wooden frames with their tendencies to warp and spoil the appearance of the sign. Universal frame parts can also be adapted to many other uses, such as toilet partitions, stock-room partitions, vegetable bins for the basement, in the erection of marquis, restaurant fixtures, etc. Complete information and price list may be had by writing the manufacturers. Universal Frame Co., 2141 Humboldt boulevard, Chicago, Ill.

Personals

Rudy Jobst Dies After Year's Illness

Rudy Jobst, one of the best known sheet metal contractors and for many years one of the most active participants in sheet metal circles, both state and national, died in his home in Peoria, Illinois, January 22, after a year's illness.

Rudy Jobst was a member of one of Peoria's oldest and best known families. He was public spirited, of fine character and was held in the highest esteem by his hundreds of friends in the metal industry.

He was born in Peoria 58 years ago and had always made Peoria his home. He was one of the organizers of the Illinois State Association and until a few months ago was one of the most active members of the national association as well. How well thought of he was, is indicated by his record, which shows that he held office in one of his associations for practically all of the past 25 years. He is survived by his wife, Alice Daily Jobst, of Peoria.

Mehlhope Joins Central Alloy Steel Corp.

J. F. Mehlhope, formerly Chicago district sales manager for Central Alloy Steel Corporation and later for Newton Steel Co., has joined the sales force of the Chicago Steel Service Co., warehouse distributors for Toncan Iron and Stainless Steels, products of Republic Steel Corporation.

The Chicago company has recently remodeled and enlarged its offices and warehouse facilities and is expanding its sales force. Mr. Mehlhope brings to his new connection a wealth of experience in the sale of special steel products.

George W. Kreider, Wenona, Illinois, Dies

George W. Kreider, for many years owner of a hardware and furnace establishment in Wenona, Illinois, died January 2 at his home. Mr. Kreider was 82 years old and had been in business for 50 years. He had been a resident of Wenona since 1907.

Mr. Kreider is survived by his widow, Athlea Rutan Kreider; a daughter, Ada, and his son, Marion.

E. W. Ebert Buys Shop in Woodstock, Illinois

E. W. Ebert of Mason City, Iowa, has acquired the shop and business of Frank Czadek in Woodstock, Illinois. Mr. Czadek is retiring from business and sold his shop through an advertisement in AMERICAN ARTISAN.

Mr. Czadek wishes to thank all the salesmen, manufacturers and others with whom he has been associated during his business operations.

As for future plans, Mr. Czadek will undoubtedly arouse the envy of many readers. He says he is going to operate a fishing resort on Chippewa Lake, located about 15 miles east of Hayward, Wisconsin. His resort will be known as "Dun Rovin Lodge." He says he will be glad to see all sheet metal and furnace men who go up his way.

J. D. Gerken Passes Away in Toledo, Ohio

John D. Gerken, president and founder of the J. D. Gerken Company, pioneer Toledo, Ohio, Sheet metal and furnace contracting firm, died in Toledo on January 20.

Mr. Gerken started the company of which he was president in 1890 and was connected actively with the firm until his death. Beginning as a small sheet metal and furnace shop in his home city, he lived to see the firm become one of the largest and most progressive establishments in his part of Ohio.

Under his active guidance, the first small shop grew in size and importance until during boom building years as many as 900 furnaces were installed in a year and thousands of dollars of sheet metal contracts passed through the shop each year.

W. C. Hopson Co. in Business 50 Years

A neatly prepared and attractive booklet is now being mailed to sheet metal contractors by the W. C. Hopson Company of Grand Rapids, Mich., celebrating the company's fifty years in business. The booklet is titled "Fifty Years of Looking Forward."

The booklet is a brief history of the founder of the company—W. C. Hopson, his early struggles and successes and the philosophy which has carried him through the troubled times of the last fifty years.

Ryerson Company Adds New Officers

At a meeting of the directors of Joseph T. Ryerson & Son, Inc., on January 25th, the following changes and additions in officers were made:

Everett D. Graff, for some years a vice-president, becomes first vice-president. Robert C. Ross, formerly assistant to the president in charge of plant operations, was elected vice-president. Harold B. Ressler, general manager of sales, becomes vice-president.

Everett D. Graff

Donald L. McCubbin, assistant manager, is appointed manager of the Cincinnati plant of Joseph T. Ryerson & Son, Inc., effective February 1. Mr. McCubbin comes to this position after nine years at the Ryerson Chicago plant and more than seven years with the Cincinnati plant.

Donald L. McCubbin

Lewis E. Skinner returns to the Chicago sales organization to take over a special sales department.

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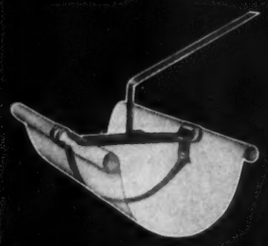

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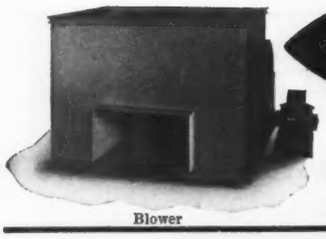
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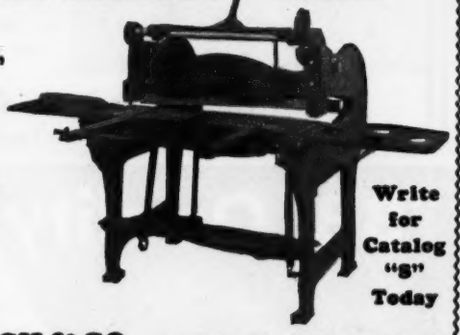

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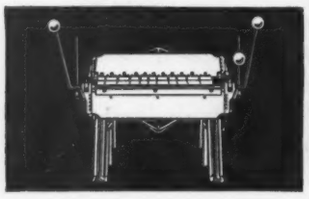
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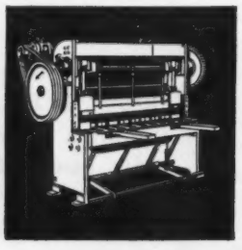
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(Continued on page 38)

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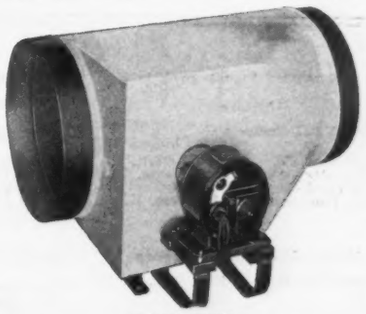
4. Furnished for either automatic or manual control.

Price list, with descriptive literature showing different models, sizes, etc., will be sent you by return mail upon receipt of your request. CLIP AND SEND THIS AD IN NOW!



PATENTED

AMERICAN FOUNDRY & FURNACE COMPANY

Bloomington, *World's largest manufacturers of blower furnace systems* **Illinois**

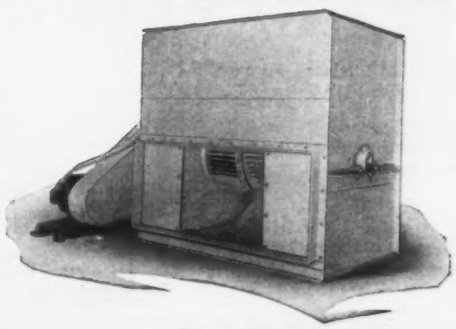
A FILTERED-AIRE BLOWER FORCES AIR TO ALL WARM AIR PIPES

Cleans the air and forces circulation.
Mounts at rear or at side of furnace.

Six reasons why you should use the Filtered-Aire Blower:

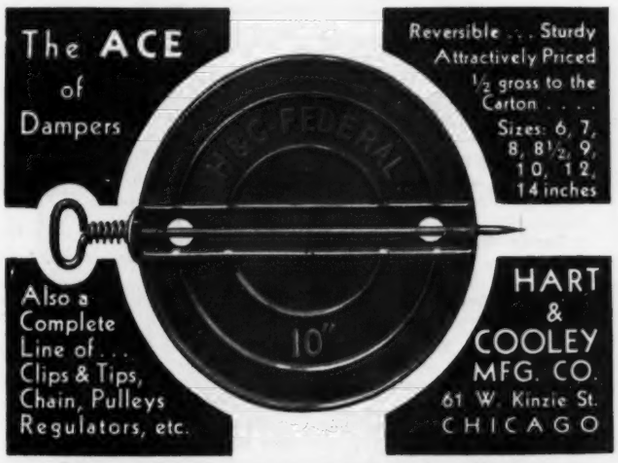
1. It is a multi-vane blower—the same type as used in big schools, churches, etc.
2. Ball bearings located outside air chamber.
3. By-pass damper automatically by-passes filters and blower for gravity circulation when fan is not running.
4. Four adjustable speeds—all quiet.
5. Rated by firepot diameter of furnace with which it is to be used. Technical ratings if desired.
6. Automatically controlled.

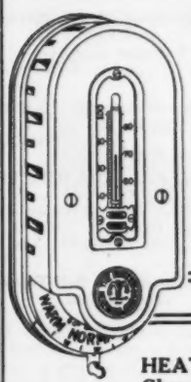
Price list, literature showing different models, sizes and full information for installing forced air jobs, wiring diagrams, etc., sent on request.



AMERICAN FOUNDRY & FURNACE CO.

BLOOMINGTON ILLINOIS **Dept. AA**


The ACE of Dampers
Reversible . . . Sturdy
Attractively Priced
½ gross to the Carton . . . .
Sizes: 6, 7, 8, 8½, 9, 10, 12, 14 inches
Also a Complete Line of . . . Clips & Tips, Chain, Pulleys Regulators, etc.
HART & COOLEY MFG. CO.
61 W. Kinzie St.
CHICAGO
10"



"FLASH"

Thermostatic—All-Electric Controlled

HEAT REGULATOR

Write for sample

THE MODERN HEAT REGULATOR CO.
Cleveland Ohio
Territory Open

Dealer's Price
$16.50
Complete

A Record We Are Proud Of!

Beat this if you can. Over 80% of the GILT EDGE dealers have sold GILT EDGE furnaces for ten years or more. There's a reason—we back every dealer to the limit with cooperation for our mutual success.

GILT EDGE
The Furnace with a GOOD Name

GILT EDGE Furnaces are constructed to give a life time of continuous trouble-free service. They create consumer satisfaction—a good furnace always does. If you are looking for a real profit builder—sell the GILT EDGE.

SCHWAB FURNACE & MFG. CO. **CEDAR GROVE, WISCONSIN**

MILWAUKEE OFFICE **522 CHERRY STREET**

Write for our catalog and dealers' Profit-sharing proposition

Say you saw it in AMERICAN ARTISAN—Thank you!

BUYERS' DIRECTORY

(Continued from page 36)

Miters

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co. Philadelphia, Pa.
Braden Mfg. Co., Terre Haute, Ind.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Nails—Hardened Masonry

Parker-Kalon Corp., New York, N. Y.

Paint—Roof

Lastik Products Co., Inc., Pittsburgh, Pa.

Perforated Metals

Chicago Perforating Co., Chicago
Harrington & King Perforating Co., Chicago, Ill.

Pipe and Fittings—Furnace

Henry Furnace & Fdy. Co., Cleveland, Ohio
Meyer & Bro., F., Peoria, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Peerless Foundry Co., Indianapolis, Ind.

Pokers—Furnace

Fanner Mfg. Co., Cleveland, Ohio
Independent Reg. & Mfg. Co., Cleveland, Ohio

Pulleys—Furnace

Hart & Cooley Mfg. Co., Chicago, Ill.

Punches

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

Punches—Combination Bench and Hand

Niagara Mach. & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.

Punches—Hand

Niagara Mach. & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

Radiator Cabinets

Hart & Cooley Mfg. Co., Chicago, Ill.

Registers

Auer Register Co., Cleveland, Ohio
Forest City Foundries Co., Cleveland, Ohio
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Independent Register & Mfg. Co., Cleveland, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Waterloo Register Co., Waterloo, Ia.;

Registers—Wood

Auer Register Co., Cleveland, O.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Regulators—Automatic Heat

Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modern Heat Regulator Co., Cleveland, Ohio
White Mfg. Co., Minneapolis, Minn.

Repairs—Stove and Furnace

Brauer Supply Co., A. G., St. Louis, Mo.
Des Moines Stove Repair Co., Des Moines, Iowa
Northwestern Stove Repair Co., Chicago, Ill.
Peerless Fdry. Co., Indianapolis, Ind.

Ridging

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Rings—Furnace Casing

Forest City Foundries Co., Cleveland, Ohio

Roof Flashing

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Roofing—Iron and Steel

American Rolling Mill Co., Middletown, Ohio
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., The, Newport, N. Y.
Republic Steel Corp., Youngstown, Ohio

Roofing—Tin and Terne

Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Republic Steel Corp., Youngstown, Ohio

Rubbish Burners

Hart & Cooley Mfg. Co., Chicago, Ill.

School—Sheet Metal Pattern Drafting

St. Louis Technical Institute, St. Louis, Mo.

Schools—Warm Air Heating

St. Louis Technical Institute, St. Louis, Mo.

Screws—Hardened Metallic Drive

Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Parker-Kalon Corp., 200 Varick St., New York

Screws—Hardened Self-Tapping, Sheet Metal

Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Parker-Kalon Corp., New York

Screens—Perforated Metal

Chicago Perforating Co., Chicago, Ill.
Harrington & King Perforating Co., Chicago, Ill.

Scuppers

Aeolus Dickinson, Chicago, Ill.

Shears—Hand and Power

Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Viking Shear Co., Erie, Pa.

Sheet Metal Screws—Hardened, Self-Tapping

Parker-Kalon Corp., New York

Sheets—Alloy

Inland Steel Co., Chicago, Ill.
International Nickel Co., New York, N. Y.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio

Sheets—Black, Corrugated, Galvanized

American Rolling Mill Co., Middletown, Ohio
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, O.

Sheets—Copper

American Brass Co., Waterbury, Conn.
Revere Copper & Brass Inc., Rome, N. Y.

Sheets—Copper Bearing Steel

American Rolling Mill Co., Middletown, Ohio
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio

Sheets—Copper (Lead Coated)

American Brass Co., Waterbury, Conn.
Revere Copper & Brass Inc., Rome, N. Y.

Sheets—Iron

American Rolling Mill Co., Middletown, Ohio
Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, O.

Sheets—Monel Metal

International Nickel Co., New York

Sheets—Nickel

International Nickel Co., New York

Sheets—Pure Iron Copper Alloy

Newport Rolling Mill Co., Newport, Ky.

Sheets—Refined Open Hearth Iron

American Rolling Mill Co., Middletown, Ohio

Sheets—Special Finish

American Rolling Mill Co., Middletown, Ohio
Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
J. M. & L. A. Osborn Co., Cleveland, Ohio
Republic Steel Corp., Youngstown, Ohio

Shingles and Tile—Metal

Globe Iron Roofing & Corrugated Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Skylights

Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Snow Guards

Berger Bros Co., Philadelphia, Pa.
David Lerow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

Solder

Kester Solder Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Solder—Acid Core

Kester Solder Co., Chicago, Ill.

Solder—Rosin Core

Kester Solder Co., Chicago, Ill.

Solder—Self-Fluxing

Kester Solder Co., Chicago, Ill.

Soldering Furnaces

Diener Mfg. Co., G. W., Chicago, Ill.

Soot Destroyer

Saginaw Salt Prod. Co., Saginaw, Mich.

Specialties—Hardware

Diener Mfg. Co., G. W., Chicago, Ill.

Stars—Hard Iron Cleaning

Fanner Mfg. Co., Cleveland, Ohio

Stove Pipe and Fittings

Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Stove and Furnace Trimmings

Fanner Mfg. Co., Cleveland, Ohio

Strainers—Roof

David Lerow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

Straps—Ornamental Pipe

David Lerow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

Tinplate

Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Republic Steel Corp., Youngstown, O.

Tools—Tinsmith's (See Machines—Tinsmith's)

Torches

Diener Mfg. Co., G. W., Chicago, Ill.

Unit Air Conditioners

American Fdry. & Furnace Co., Bloomington, Ill.
Andes Range & Furnace Corp., Geneva, N. Y.
Dail Steel Products Co., Lansing, Mich.
Fox Furnace Co., Elyria, Ohio
Henry Furnace & Fdry. Co., Cleveland, Ohio
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fieberger Co., Newark, Ohio
Meyer Furnace Co., Peoria, Ill.
Midland Furnace Co., Columbus, Ohio
Motor Wheel Corp., Lansing, Mich.
Payne Furnace & Supply Co., Beverly Hills, Calif.
Rudy Furnace Co., Dowagiac, Mich.
Waterman-Waterbury Co., Minneapolis, Minn.

Vacuum Cleaners—Furnace (See Cleaners—Furnace Vacuum)

Ventilators—Ceiling

Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Independent Reg. & Mfg. Co., Cleveland, Ohio

Ventilators—Floor

Aeolus Dickinson, Chicago, Ill.

Ventilators—Roof

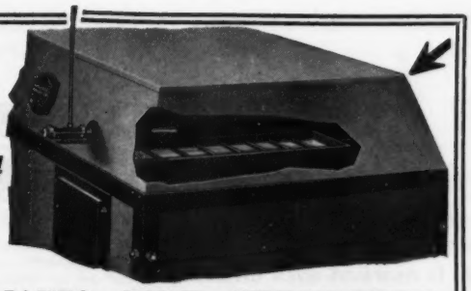
Aeolus Dickinson, Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Burt Mfg. Co., Akron, Ohio
Jordan & Co., Paul R., Indianapolis, Ind.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Water Pressure Regulators

Apex Regulator Co., Marshalltown, Ia.

Wood Faces—Warm Air

Auer Register Co., Cleveland, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

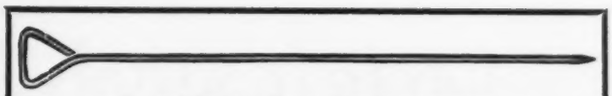


For Correct and Controlled Humidity

AUTOMATIC DRIP HUMIDIFIER

Here's the *different* Humidifier you've been looking for. Simple, foolproof, reliable. Offers real sales possibilities. *Investigate.*

AUTOMATIC HUMIDIFIER COMPANY
Cedar Falls, Iowa



FURNACE POKERS STRAIGHT OR BENT POINT

Plain or Japanned
½"—⅝" and ¾" diameter
Lengths from 3 to 6 foot
DEPT. F
FANNER MANUFACTURING CO.
BROOKSIDE PARK CLEVELAND, OHIO

It's Non-Porous

SET YOUR NEXT JOB WITH LASTIK

WAMPUM BRAND FURNACE CEMENT

LASTIK PRODUCTS COMPANY, Inc.
OLIVER BLDG. PITTSBURGH, PA.

WATERBURY SEAMLESS FURNACE
REG. U.S. PAT. OFF. PIPE OR PIPELESS

Permanently Gas-Tight

One-Piece Steel Construction—Durable and Economical

Waterman-Waterbury Co.
1122 Jackson St. N.E.
Minneapolis Minnesota

Keep Your Shop Busy All Winter With the Tornado Furnace Cleaner

The Tornado Furnace Cleaner gets you into the basement where it is easy to sell furnace repairs. And you make a profit on the cleaning job too!

One dealer sold 150 repair jobs as a result of furnace cleaning.

Tornado is most powerful cleaner built, low in price.

Write for sales plan that tells you how to get the business

Only $149.50 Easy Terms and Free Trial

Breuer Electric Mfg. Co.
865 Blackhawk St., Chicago

SIMPLEX HUMIDIFIER

IT'S EASY TO SELL
—
IT'S EASY TO INSTALL
—
IT'S TRULY AUTOMATIC
—

Write for our dealer, jobber or manufacturer proposition.

SALLADA MANUFACTURING CO.
720 South 4th St., Minneapolis, Minn.

Efficient • *Powerful* • *Automatic*

Easy to Sell — *Easy to Install*

Write To-day for Full Information and Name of Nearest Jobber

A-C Thermostatically Controlled *Automatic* **HEAT BOOSTER**

A-C MANUFACTURING COMPANY
417 SHERMAN AVENUE PONTIAC, ILLINOIS

The Electric Janitor

FULLY ELECTRIC MOTOR-DRIVEN

Limit Controls Available

TRADE PRICE $24.50

Consumer Price $49.00 Plus Installation

Product of TIME-O-STAT CONTROLS
Division of Minneapolis-Honeywell Regulator Company
ELKHART, IND. and MINNEAPOLIS, MINN.

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Classified Advertising

BUSINESS CHANCES

Lightning Rods—Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. L. K. Diddle Company, Marshfield, Wis.

For Sale—A bargain. One No. 30 slightly used Bryant warm air gas furnace complete with humidifier and eight day thermostat. Address Jacob Brenner Company, Inc., 47 Third Street, Fond du Lac, Wisconsin. H-545

For Sale—Sheet metal and oil burner shop in town of 10,000, or will sell tools separate including 8 foot brake. Old age and poor health reason for selling. Address C. E. Walters, 418 East Lincoln Highway, De Kalb, Illinois. M-545

Wanted to Buy—Established sheet metal and furnace shop for cash, in city of over 25,000. Reply to X-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

For Sale—At your own price—25 pounds 50/50 bar solder. Address S. Gard, 4639 West End Avenue, Chicago, Illinois. Telephone Mansfield 9132. C-546

For Sale—Well established furnace and sheet metal shop in St. Louis. A No. 1 tool, good truck, shop well stocked with material. Price, $800. Terms. Reason for selling, retiring. Address O-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

For Sale—a first class furnace and sheet metal shop in central Iowa. Well established. Tools, stock and equipment, $1500.00. Address R-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Wanted to buy for cash—Stock of furnaces and registers. Price must be right. Address Budd Clusserath, 586 Fayette Street, Hammond, Indiana. S-545

HELP WANTED

Salesmen Wanted—Well known and established manufacturer of sheet metal products has good north central territories open for experienced salesmen, preferably those now calling on sheet metal shops in Illinois, Wisconsin, Michigan, Indiana and Iowa. For men now contacting this trade, this will be profitable side line. Liberal Commission. When writing give character and experience. Address L-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

SITUATION WANTED

Situation Wanted—By technical school graduate. Wide experience in factory and general shop work. Address P-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—Heating engineer, well known in the industry, with experience in sales promotion and advertising, desires connection with firm interested in developing air conditioning equipment. Excellent training, broad experience, best of references, and a record that will stand investigation. Address B-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

HELP WANTED

WANTED!

SEVERAL GRADE A-1 FURNACE INSTALLERS

•

To be schooled in salesmanship at our expense, given protected sales territories with drawing account and liberal commission. Others in the same set-up are earning $1500 to $3500 a year right now. There's a chance for you to do as well in a brand-new territory, for this nationally famous $3,000,000 company.

Only good installers, men of real ambition and good reputation, need apply. Must be between ages of 25 and 45, and married. This opportunity closes March 1st, so if you are the man write AT ONCE in confidence. Give full information about the length of your experience, who your employers were, etc.

Box No. Y-545, Care
AMERICAN ARTISAN
139 N. Clark St. Chicago, Ill.

SITUATION WANTED

Situation Wanted—Engineer or sales engineer, gravity and fan heating, air conditioning, member A. S. H. V. E., A. S. M. E., twenty years successful retail and wholesale experience. Address K-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—By a first class plumber, steam fitter and sheet metal worker. Good worker. Can furnish best of references. West or North West preferred. Address J. J Herlick, Box 473, Harvey, North Dakota. S-544

Situation Wanted—By practical sheet metal and furnace man. Experienced in gravity and conditioned air. Have complete knowledge of layout, estimating and sales. Would like to make a connection with some reliable firm. Can locate anywhere. T-544, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

Situation Wanted—By all around Scandinavian tinner and furnace man Have had some business experience. Prefer Minnesota, Iowa, or Nebraska. Address C-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—Good sheet metal man and plumber now open for good job. A-1 references. Married. Will go any place. Address M-544. AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

SITUATION WANTED

SITUATION WANTED

By Heating Engineer, broad acquaintance and experience, desires Indianapolis or Kansas City territory with progressive manufacturer or jobber. Unusual record—sales, advertising and engineering. Experienced in general stove line, gravity and forced air heating, automatic control, air conditioning and trunk line layout. Middle age, married, owner of home and car. References to character, integrity and ability. Eight years with present firm.

Address F-546, AMERICAN ARTISAN
139 N. Clark St. Chicago, Illinois

Situation Wanted—By an experienced hardware clerk and salesman. Would like to make a change with some good hardware firm by March 1st. Wisconsin preferred. Address R-544, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—By first class sheet metal worker. Can layout and estimate large or small work. Long experience in Government detail, indirect heat, fan systems, and ventilating. 40 years old. Will go anywhere. Address X-544, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—By a sheet metal and furnace man Can also do plumbing. Any reasonable offer will be accepted. Can come any time. Address W. H. Parker, 402 Pennsylvania Avenue, Abington, Illinois. Z-544

Situation Wanted—By first class sheet metal worker. Experienced in shop work, pattern drafting, skylight, ventilating, air conditioning, blow pipe and all outside work, both in the making and erecting. Best of references. Married, sober, and reliable. Would like good year round proposition if possible in Iowa or southern Minnesota. Address A-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago. Illinois.

Situation Wanted—Have had 28 years experience as tinner and plumber. Am qualified to do work in the following lines: auto radiator repairing, erecting steel ceilings, pump and windmill repairing, steam and hot water work, installing radios, and any kind of mechanical job that comes in a shop. Can give good references. Address G-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

Situation Wanted—By young man 30 years old with sixteen years experience in all branches of the trade. Can estimate, cut patterns, handle men, and have the ability to close a job. Am now employed but am going to change March 1st. Married, strictly sober and of neat appearance. Address W. H. Sapp, 711 Highland Avenue, Albany, Georgia. T-545

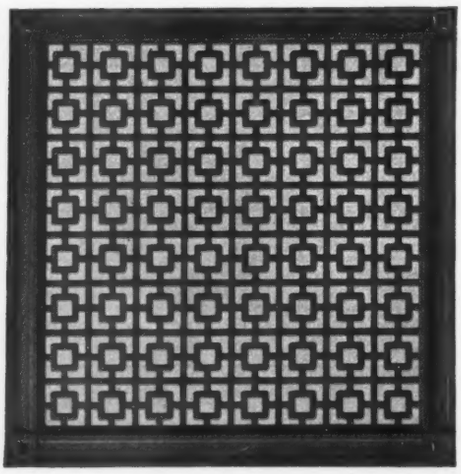
Situation Wanted—By a first class sheet metal worker. Experienced in heating and ventilating of all kinds. A-1 neon sign builder. Will go anywhere. Address Lawrence H. Couchman, 324 Penn. Avenue, Wichita, Kansas. W-545

Situation Wanted—By sheet metal worker. Competent in all branches of the trade. Location immaterial. Correspondence solicited. Work must be reasonably steady. Address C. L. Summerson, 327 East Gage Avenue, Los Angeles, California. A-546

Situation Wanted—By A-1 mechanic, sheet metal worker and furnace man. Can read blueprints. estimate work, lay out patterns and take charge of shop. Have done all branches of work. Strictly temperate and reliable. Permanent position desired. Address B-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

Situation Wanted—By tinner. Steady reliable man, good on furnace and gutters, also general jobbing. Would like to locate in or near Elgin or small town near Chicago. Address S. Gard, 4639 West End Avenue, Chicago, Illinois. D-546

Perforated Metals...



for every purpose

No matter what the uses we can perforate metal to meet the purpose. In Public Buildings, Churches, Schools, Factories and homes our grilles are dominant. There are hundreds of designs to select from.

"GRILFRAME"

Enhances the beauty of any grille by the addition of a border frame of steel. You can do it with "Grilframe." Agents everywhere.

The H. & K. Line consists of perforated sheets and a full selection of Guard accessories.

WRITE FOR CATALOG AND QUOTATIONS. Perforated metals for every purpose

– SAFETY GUARDS –

THE HARRINGTON & KING PERFORATING CO.

5649 Fillmore Street **New York Office, 114 Liberty Street** **Chicago, Ill., U. S. A.**

Have Your Trunk Ducts and Branches Designed by Overton for 40c Per Warm Air Grille!

Dealers can save from $50.00 to $100.00 on each job in material and labor alone, through using scientifically designed trunk lines and branches. The time saved in an attempt to balance a poorly designed system will more than pay for the cost of my engineering service.

NOTE THESE PRICES!

RESIDENCES

Up to and including 5 rooms	$1.10 per room
5 to 9 rooms inclusive	$1.00 per room
10 to 15 rooms inclusive	$0.85 per room
16 to 20 rooms inclusive	$0.80 per room
21 rooms and over	$0.75 per room

CHURCHES

Up to and including 50,000 cu. ft. gross content	$0.12 per 1,000 cu. ft.
50,000 cu. ft. and over	$0.10 per cu. ft.

SCHOOLS

20,000 to 50,000 cu. ft.	$0.30 per 1,000 cu ft.
50,000 to 70,000 cu. ft.	$0.25 per 1,000 cu. ft.
70,000 to 100,000 cu. ft.	$0.20 per 1,000 cu. ft.
100,000 cu. ft. and over	$0.15 per 1,000 cu. ft.

FACTORIES, GARAGES

Duct systems	$0.12 per 1,000 cu. ft. gross content
Unit heater systems	$0.10 per 1,000 cu. ft. gross content

SPECIAL NOTE

Where heating systems include filters, washers, temperature control as EXTRA EQUIPMENT — add 20 per cent to listed prices.

Where filters, washers, temperature controls are A PART OF THE HEATER AND ARE UNDER ONE CASING—listed prices apply.

For complete working plans detailing all trunk lines in ¼-inch scale and showing details of elbows, stacks, branches, sections, cross sections of walls—add 50 per cent to list prices.

Add $0.01 per square foot of direct radiation for combination systems.

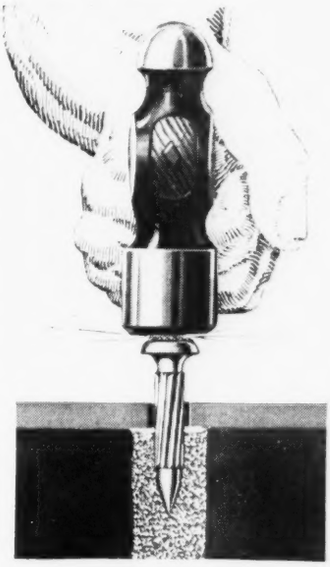
PLATTE OVERTON *Consulting Engineer* **2100 City Hall Square Bldg., Chicago**

These Economy Devices Help You do good work for less money, *profitably*

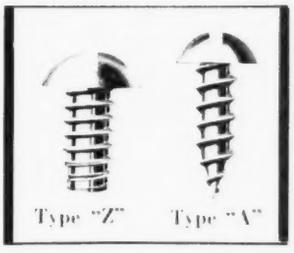
Today sheet metal workers have the problem of turning out good work for less money. In order to accomplish this and still make a profit, the work must be done the most economical way. On this page are shown Parker-Kalon Products which have proved their ability to cut costs for sheet metal workers. They can be of real help to you now. At your request we will send free samples of the devices shown below.

This is the Cheapest means of making fastenings to masonry

Hardened Masonry Nails offer the simplest, cheapest way of fastening flashings, sheathing, gutters and other sheet metal work to brick, mortar and concrete. Not only do Masonry Nails cost less, but they also require less labor to use than expansion bolts, hooks, anchors and similar devices. You can drive Masonry Nails right into mortar and cinder blocks. In harder materials, such as brick and seasoned concrete, you merely drill a small starting hole. Fastenings made this simpler way are secure, too.



PARKER-KALON
HARDENED
Masonry Nails
PATENTED NO. 1485202



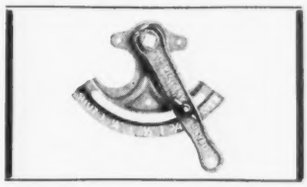
Hardened Self-tapping Sheet Metal Screws — cheapest means of assembling sheet metal. Turn them into drilled or punched holes. Type "Z" for use in 28 ga. to 6 ga. metal. Type "A"—for metal up to 18 ga.

PARKER-KALON
HARDENED SELF-TAPPING
Sheet Metal Screws

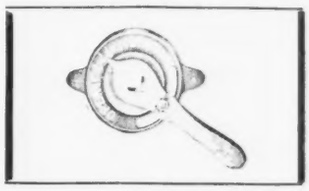
Hardened Screwnails — make it unnecessary to use costly wood screws where a secure sheet metal to wood fastening is required. Driven like nails, yet hold 4 times better.

PARKER-KALON
HARDENED
*Screw*nails
PATENTED NO. 1482151 — OTHERS PENDING

You can do better work with these Damper Regulators

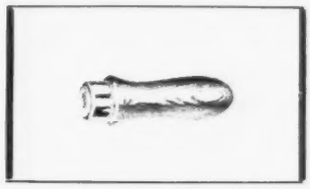


Hyro Damper Quadrant — the standard and most efficient damper control. Easily and quickly attached to round or rectangular ducts.

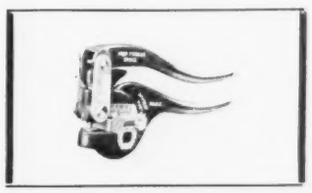


Hyro Dial Damper Regulator — An inexpensive and greatly favored device for controlling small dampers.

These Tools save your time on the job

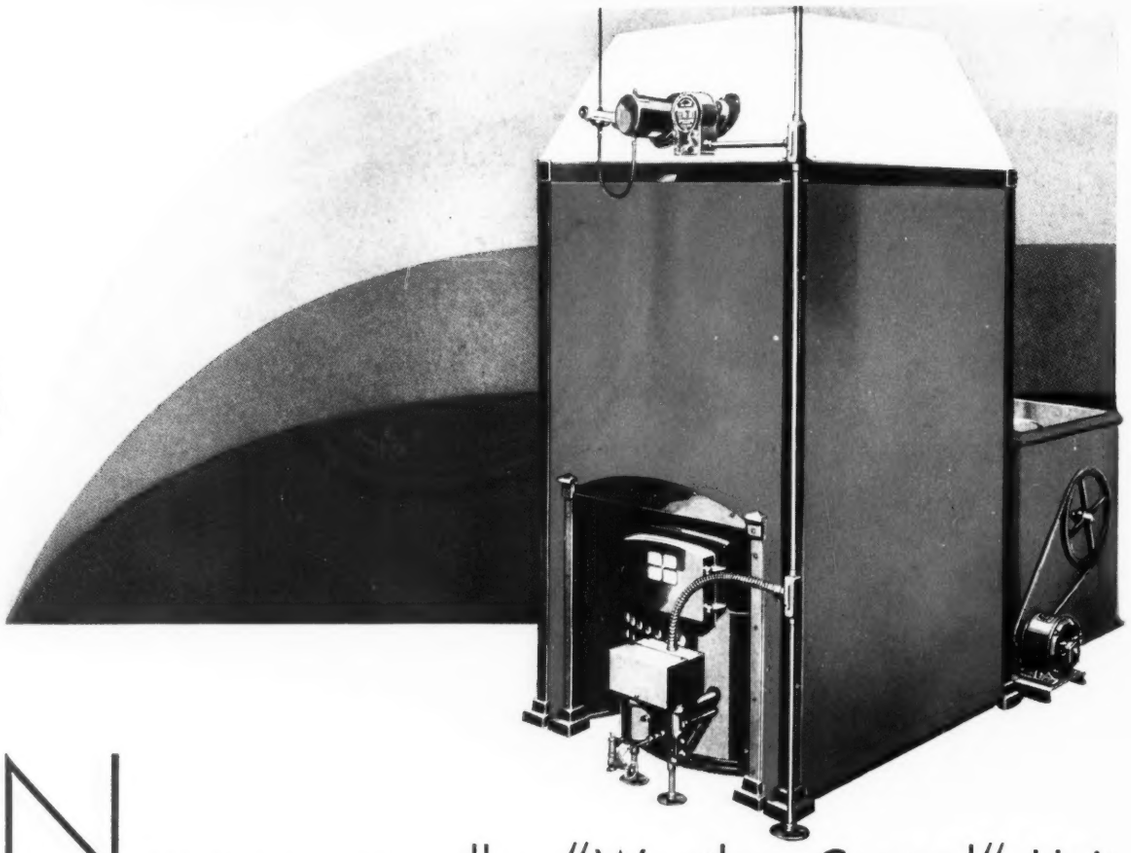


Hyro Shur-Grip Handle for solder irons . . . screws on and stays on . . . outlasts a dozen ordinary handles.



Hyro O. V. Metal Punch is the handiest tool a sheet metal worker can have. Has greater power than any punch of its size—capacity of $\frac{1}{4}$ in. holes in 14 gauge steel, or equal.

PARKER-KALON CORPORATION, 190 VARICK STREET, NEW YORK, N.Y.



Now you can sell a "Weather Control" Unit so low in price that hundreds can buy!

No one wants to go out and sell old-fashioned heating installations against today's aggressive market. Home-owners expect the most advanced oil-burning appliances at the minimum cost. That's why the MW "Weather Control" Unit builds such profitable business for dealers.

It is the last word in efficient oil-burning heating; yet its cost is so low that it is well within reach of your average household. Many more prospects; many more sales!

MW "Weather Control" Unit can be hooked up to the present hot-air wall ducts; reduces the ducts in the basement. That simplifies installation, pleases the customer. This Unit is a matched unit which combines combustion chamber, oil burner, thermostatic control, humidifier, air-circulating blower—all working together as one compact, efficient whole.

Automatic, economical and quiet, the MW Unit provides considerable fuel saving, making 5 gallons of oil produce the heat ordinarily taking 8 gallons to produce. This is due to exact *matching* of steel combustion chamber and oil burner.

The application of lacquer to the outer surface is a big drawing card, made practicable by the insulated double casing. This Unit is listed as Standard by the Underwriters' Laboratories.

MW Boiler Unit

This MW Oil-Burning All-Steel Boiler Unit—for hot water or steam heat—is amazingly efficient because it's a *matched* unit. Both the boiler and the burner are designed to operate together. Thermostatically controlled and extremely quiet. Listed as Standard by the Underwriters' Laboratories.

MW Water Heater

The MW Oil-Burning Water Heater gives an inexhaustible supply of hot water at a heating cost of only 1-20th of a cent a gallon. This MW Oil-Burning Water Heater is automatic and thermostatically controlled. And it's noiseless, with not a single moving part. Listed as Standard by the Underwriters' Laboratories.

The MW *Franchise Plan* is Still Open to a Few Dealers.

This popular plan has developed good business for many others. Don't delay, but find out about it, *Now!* Just write for details.

MW

WEATHER CONTROL

(manufactured by MOTOR WHEEL CORPORATION, Heater Division, Lansing, Michigan)